

THE MISSING LINK

An intermediate seafront landscape

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Master of Landscape Architecture
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RMIT University

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– An intermediate seafront landscape

How landscape can set the structure for a waterfront re-development
and provide a durable urban environment for Sanya city.

A project submitted in fulfillment of the requirements for the degree of
Master of Landscape Architecture

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Declaration

I certify that except where due acknowledgment has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

Lin Zhang

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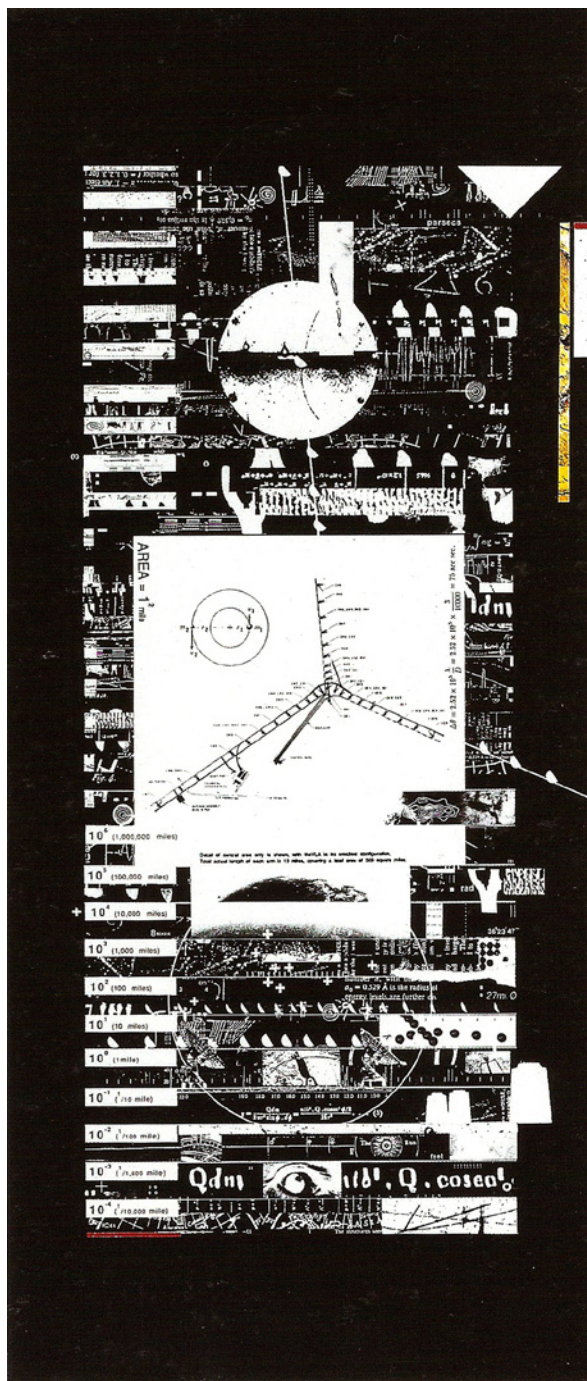
The re-development of Sanya central waterfront is currently the key issue in Sanya city... Can landscape set a structure for the waterfront re-development and provide a durable urban environment for Sanya city?



Bird view of Sanya central waterfront

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Preface

The process of landscape architecture discourse in China is at a less advanced stage than it is in Western countries. Currently in China, landscape architecture still follows the old definition relating to gardens and vegetation; it has always been relegated to a secondary position behind architecture and urban planning.

Under the rapid processes of industrialization and urbanization in Chinese cities, the traditional aesthetic features of landscape architecture make it difficult to position itself in the transforming Chinese urban context. The profession of landscape architecture is facing a change. My desire to promote the importance of the urban landscape and position it in the development of Chinese cities has encouraged me to choose landscape as my master subject.

After three years' work experience as an urban planner, dealing with tedious planning themes for government, blinkered designs for clients and the lack of theoretical knowledge and systematic thinking, has encouraged me to choose research as my master type.

This research master reflects the shifts in my understanding of landscape; it is the beginning of my discovery of landscape of the future.



*The fragmented urban space in Sanya
central waterfront*

Research topic

This research is an investigation into the phrase ‘intermediate landscape’ and tests this concept in the re-development of the Sanya waterfront, China. The phrase is based on the ‘missing link’ in the current disconnection between the landscape and urban development in Sanya city. If the landscape is considered as a connection across scales and urban systems rather than an isolated system, then how can landscape affect the structure and function of urban development? The ‘intermediate landscape’ considers the impact of understanding landscape not as an additional layer, but as a structure that can connect the urban context at different scales while at the same time addressing its function. This project attempts to formulate strategies of ‘intermediate landscape’ to coordinate the transformation of developing cities.

Research question

“The missing link ... is where many urban fragments come together and often contradict the overall natural congruity of a site.”¹

The research began with an investigation of the ‘missing link’ in the urban transformation of Sanya city. Since the 1990s, and with a booming population and rapid expansion, Sanya city has undergone the transformation from a resort destination made up of separate resort zones to an integrated seafront city with a recognizable hierarchy. With the city expanding vertically and horizontally into the hinterland, increasing density and complex activities have created increasing pressure on the central seafront. However, in the development and renovation of the Sanya waterfront, the current structure of the existing site and the framework of its planned theme don’t offer an effective solution in addressing the urban transformation

Introduction

of the development. With a new relationship between the seafront and the urban context, a new seafront landscape framework should be established to coordinate the waterfront development.

The key question in the research is how landscape can set a structure for the waterfront re-development and provide a durable urban environment for Sanya city. The associated two sub-questions within the research are:

- How can landscape act as a connection within the urban context and set of systems?
- How to understand 'scale' and work across a range of scales simultaneously?

By studying site context and urban conditions, using precedents and theories to form the research concept, and setting up the project with different scenarios, the research attempts to set a structure for the waterfront re-development and provide a durable urban environment for Sanya city.

Research methodology

This research focuses on the phrase 'intermediate landscape' to investigate the landscape in terms of 'scale' and 'connection'. To establish a framework for this research, a set of precedents (both theoretical and practical) are selected and investigated as to how they reflect the role of 'scale' and 'connection' in the landscape design process. By expanding the theories and precedents, the research has been filtered through four concepts: zoning, layering, thickening and merging. These concepts are a practical reflection of 'scale' and 'connection' and help me to understand landscape in different scales and within different sets of conditions. This set of concepts also enables me to test the notion of 'intermediate landscape' in a waterfront re-development.

Research project

The main project I focused on in this research is the Sanya central waterfront re-development. The testing of the four concepts has led to four scenarios that summarize the key ideas and methodologies for designing the 'intermediate landscape'. The central waterfront landscape plan, the old residential area re-development, the foreshore development and the seafront landscape design are all tested in the research site. The four scenarios not only act in their own scale and context, but they also work together as an integrated system across scales to form the overall structure of Sanya city.

Research structure

This thesis records the processes undertaken to complete the research – the study of site context and changing urban conditions; the use of precedents and briefs to form the research model; the set up of the project through four scenarios to test the research concepts. This master research is aimed at understanding landscape as a series of connections and how landscape can frame the structure for urban development.

01. Site

This chapter begins with the introduction of the background to the research site and the transformation of the character of Sanya city. Being critical of the government's limited solution for dealing with urban development, the notion of the missing link was introduced as a research problem followed by an investigation of the missing link in the research site.

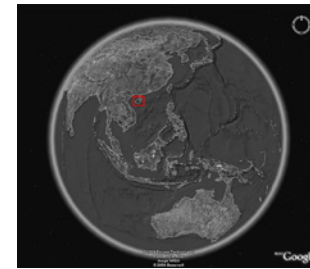


Research site:
Sanya central seafront

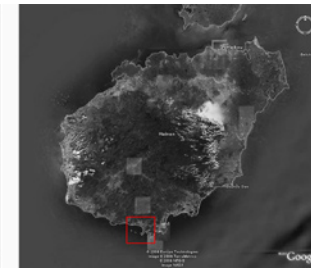
Aerial view of Sanya central city
Image from: Sanya Planning Department

Site introduction

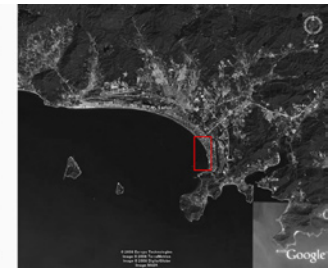
Sanya city is a seafront city in south China. In two decades, Sanya has grown from a small fishing village to a waterfront city with over 200,000 inhabitants. According to the Sanya Plan 2020, by the end of the next decade the population will approach 500,000 (an average medium-sized city in China). After twenty years of continual construction, experimentation and innovation, Sanya has developed from a resort-based, single-industry city to a multi-functional city, and has reached a level of “mass” that will make it redefine itself.



China south coast: Hainan province



southern seafront city: Sanya



Site: Sanya central waterfront



Sanya central waterfront

This research is focused on the central waterfront area of Sanya city, from Jinjiling Road in the north to the Sanya river mouth in the south, including the entire peninsula area. The foreshore area of the site is mainly occupied with beach, woods and recreational facilities, around which are sited newly developed resort hotels and resort apartments. The hinterland is occupied with high-density, new and old residential buildings. Phoenix Island is a man-made island currently under construction. According to the concept plan, the island will be built as an international harbor and entertainment center.

The central waterfront area, which is located in the geometric centre of Sanya city, offers a combination of easy accessibility and the availability of public space. It was chosen as the research site because of the opportunity it afforded to investigate the natural structure and its link to the development and renovation of Sanya city. As the central part of the city, the site offers an integration of systems and a contradiction of forces that run through the site and form the missing link between urbanization and nature.



1. Seafront open space



2. Seafront open space



3. Seafront road



4. Non-stop construction



5. Foreshore resort buildings



6. Old residential zone



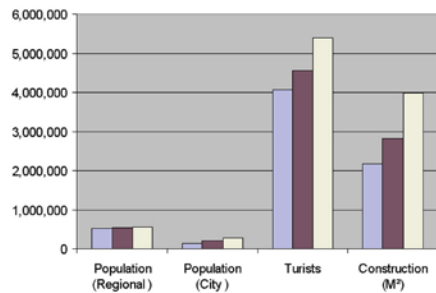
7. 'Urban village'



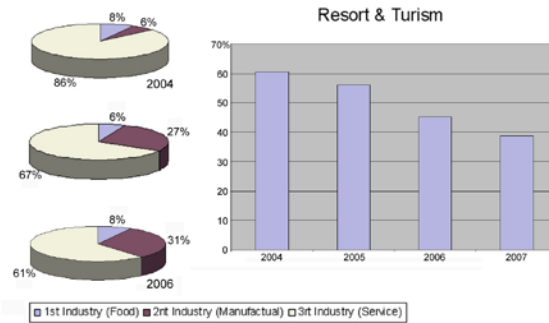
Sanya city 1991
Image from HNphoto.com.cn



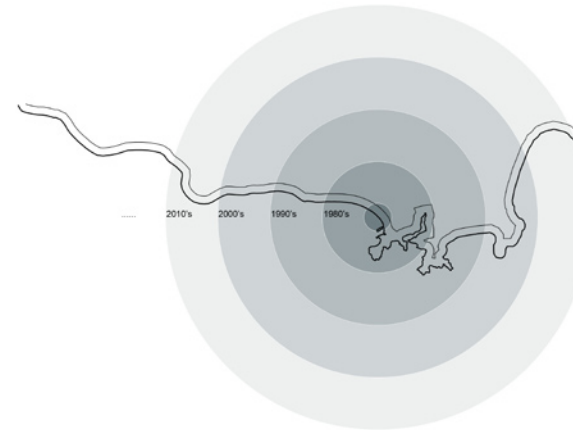
Sanya city 2007



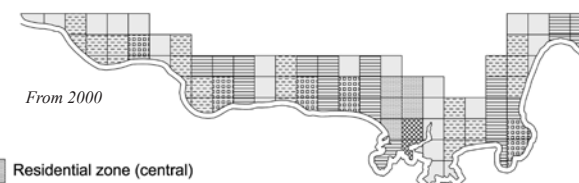
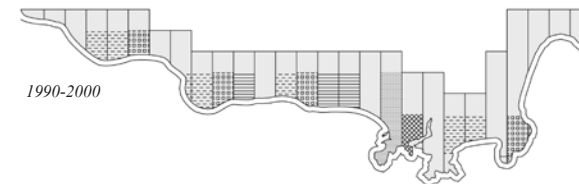
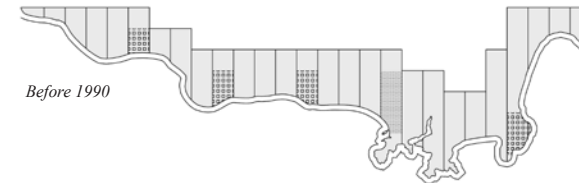
The urbanization of Sanya increased about 30% annually in 05-07
Data from: Sanya Statistics Department



The emergence of new industries replaced the resort & tourism based single industry structure indicating new function types and activities
Data from: Sanya Statistics Department



In 20 years, Sanya transformed from a fishing village to a medium size city. The amount of construction of Sanya city increased over 35% annually in 05-07.



- Residential zone (central)
- Resort residential zone
- Resort hotel zone
- Recreational zone
- Village zone

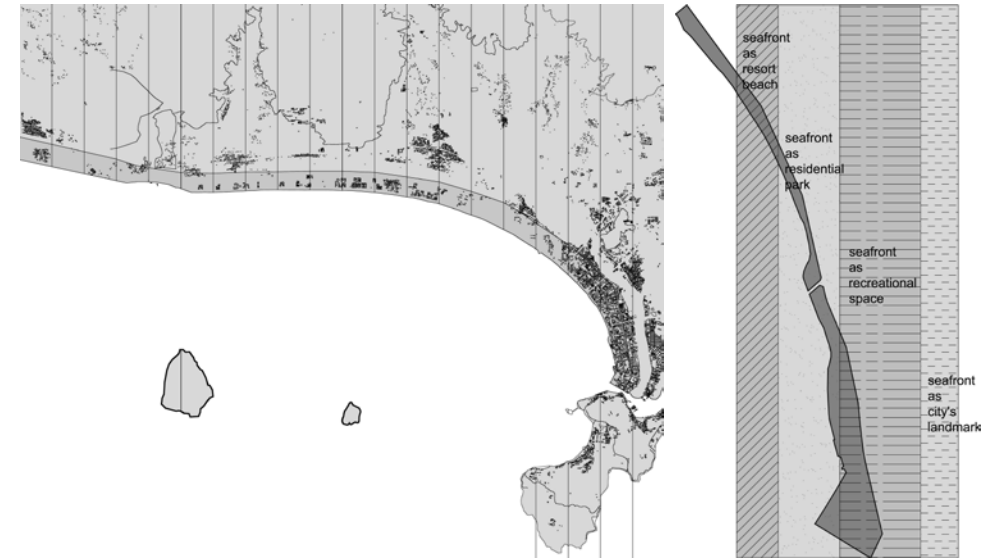
Urban structure transformation process from Sanya's development

Transformation of Sanya city

The urbanization in China progresses at about 1% annually. There is less than 40% of the nation's 1.3 billion population now inhabiting urban areas, and this number will increase to more than 70% in the coming 15–20 years. In Sanya, according to the Sanya Plan 2020, the urban population has increased by 30% every year over the last twenty years. At the same time, with an increasing number of tourists arriving from eastern Europe, Japan, Korea and south-east Asia, and increasing by over half a million every year, urban construction is moving apace to cater for this increase.

However, the decrease in the rate of growth of the tourist industry indicates Sanya is undergoing a change from a single industry involved with tourism and a resort-based small town to a multi-functional city.

These numbers represent twenty years of non-stop construction and innovation. Sanya city is undergoing a transformation from separate and distinct areas, each with its own concentration of functions and facilities, to an integrated city in chaos as a result of rapid development and incomplete structures. Under this transformation, the rapid development has caused urban sprawl and, more importantly, a fragmented urban form.



Seafront figure-ground diagram (2002):
develop along the seafront then sprawl into the hinterland

Increasing desire for the seafront from urbanization



Sanya urban elevation 1992
Image from: Sanya Planning Department



Sanya urban elevation 2007



Non-stop construction into hinterland



Limited open space in seafront foreshore area



Fragmented space in the old residential area



Fragmented space between foreshore resort area

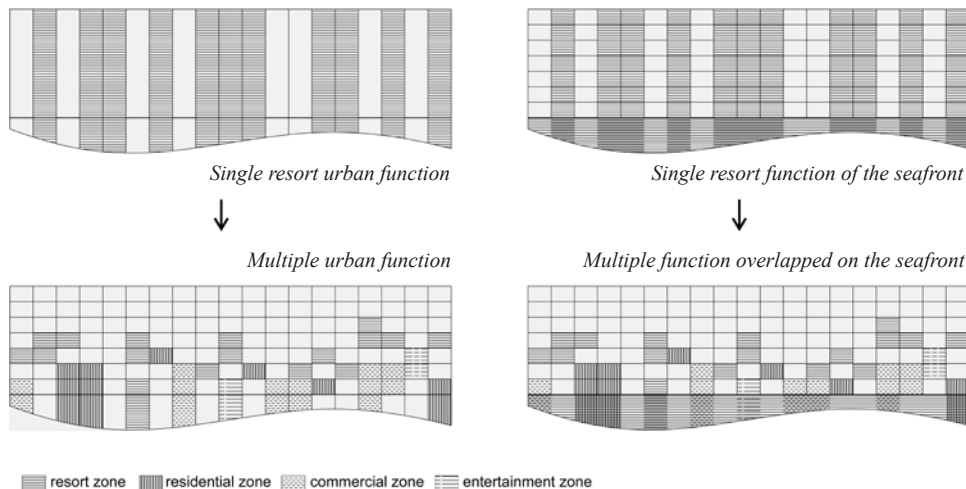
Natural structure & urbanization

Sanya city is famous in the Asia-Pacific area as a resort and tourist destination as a result of its natural features – a tropical climate, a mountain-enclosed waterfront and high-quality beaches. The seafront is enclosed by the surrounding mountains and it is a short distance from the coast to the mountains. The mountains are regarded as part of the urban structure and background to the city. In contrast, there is a series of mountain parks that offer different vantage points for viewing the city and the waterfront. The city has its identity inside and outside itself. Its unique city character and natural structure have enabled Sanya the opportunity to develop and urbanize.

In the 1990s the city developed along the coast and its main function was in the provision of resorts and tourism. At that time the seafront open space was separated into different functional areas with the resorts utilizing the space for their own backyards. The utilization of the seafront was simply to serve tourism.

Over the last few years, with the central city facing the pressure of urban functional transformation, a rapidly increasing population and the complexity of activities undertaken by different groups of people, the city has expanded into the hinterland. The desire for sea frontage has become acute and complex; blinding construction, non-stop renovation and addition of facilities have taken every possible inch of land close to the seafront. The increase in density and activities of both residents and travelers have increased the pressure on the seafront.

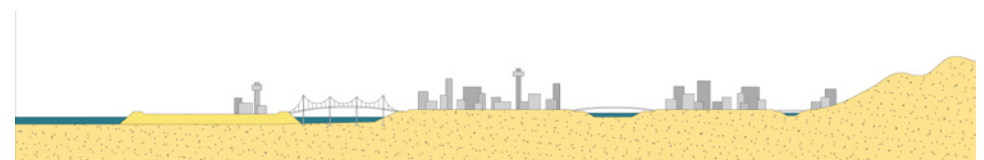
As a result of this development the former function, content and structure of the seafront open space are unable to deal with the urban transformation. At the same time, because there is no longer any natural background, no coherent open space and no longer a continuous view from the new developments, the chaos of buildings and the functional separation in the existing central waterfront has detracted from the character and natural structure of Sanya city.



Topographic features of Sanya city



Mountain enclosed waterfront



Sanya city section A-A

Government objectives, solutions and limitations

The key principle in the Sanya Plan 2020 is that 'urban development should offer a complete civic function as well as a unique urban environment. Urban development should respect the natural form of Sanya city'. During the planning period (2004–2020), the central waterfront will continue to keep changing rapidly from its past resort orientation to a high-quality mix of resorts, tourism, leisure, housing, cultural amenities, open space, recreational activity and a public service center. ²

Because the purpose was to create a balance between urban development and natural structure, the government considered it was necessary to preserve the urban character and keep the natural form of Sanya city throughout the urban construction. The government has tried different methods to control urban construction in the central waterfront area from implementing planning themes to establishing building codes.

1. Restricting the height and size of buildings (1999)

In the '90s, the government used a construction code to restrict the height and size of buildings. It didn't last long due to the underestimation of the population and increasing urbanization.

2. According to topography (2004)

According to topographic features, the government implemented restrictions – the nearer to the coast, the more height-restricted new buildings should be in order to ensure the urban physical context could merge with the natural structure. It was a contradiction to economic progress and the practice was soon ignored, resulting in high-rising buildings and mega-sized hotels.

3. High-rise buildings but restricted sprawl (2007)

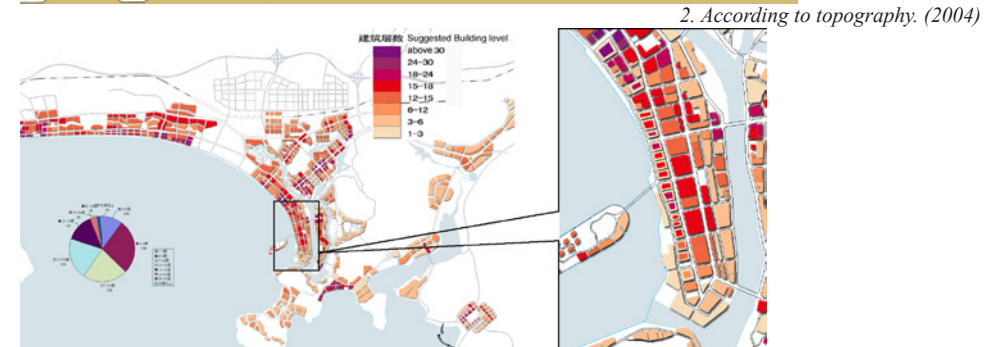
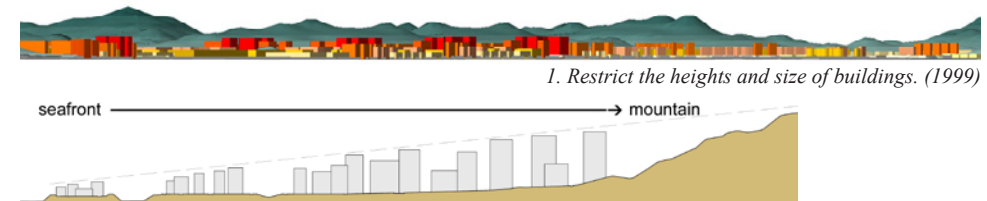
The government encouraged narrow high-rise buildings instead of continuous, more sprawling elements along the coast. As a result, the low utilization of expensive land provided an obstacle for developers and urban development.

By means of building control the government failed to find a suitable way of achieving a balance between development and the 'unique urban environment'. Firstly, simply implementing control over construction was contradictory to economic growth, and the building code had to give way to developers. Secondly, with the city sprawling and density increasing, open space in the central waterfront was decreasing; it could not offer enough space for people's recreational demands.

There are two reasons for this failure. Firstly, the natural structure was simply understood as a visual identity, and the inherent influence of nature in terms of ecological and topographic conditions was not acknowledged. Superficially catering for the natural background could not enable the connection between the urban character and nature in order to achieve a dynamic urban environment. Secondly, government measures were limited to a certain scale, and the lack of regional and relational thinking made it difficult to maximize urban capacity and integrate urban systems. Consequently, the missing link between the natural influence and urban development emerged as a key research problem.



Landscape Plan from Sanya Plan 2020 is a derivative from land-use plan, it is impotent to offer landscape structure, nor to guide urban form for Sanya's transformation



Plan of building height and size (from Sanya Plan 2020)

This research has used the Sanya Plan 2020 to understand the existing disconnection between urbanization and nature, and to criticize the limitations of government measures. Since the master plan, the zoning and existing construction codes have not guided urban development, and my research asks the question whether landscape can offer a method of informing and changing urban development while addressing the natural structure in the central waterfront, rather than relying on government policies.

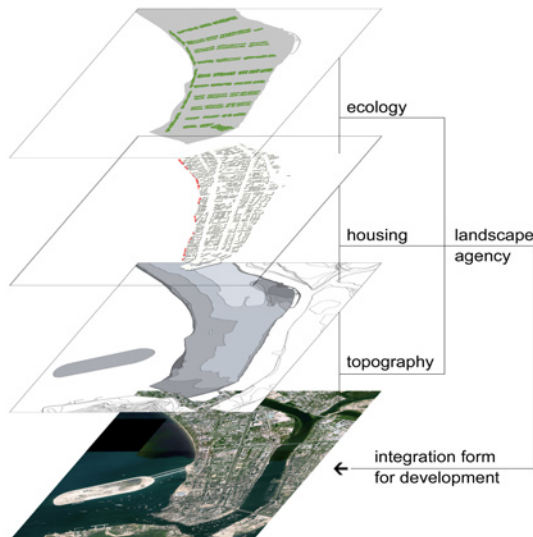
The missing link between urbanization and natural structure

To develop a structure for urban development as well as for the urban environment, the initial problem is to identify the current missing link between urban development and nature. Although it is emphasized in the Sanya Plan 2020 that any new development should respect the natural form, it appears that the principle has been barely employed in the new development. This is perhaps due to a lack of understanding of the natural structure and its impact on urban development, or alternatively, that there is no clear way of approaching the impact of the new development.

At the urban scale, the influence of natural form is still regarded as a visual background; the impact of this natural form has not been addressed in the development in terms of ecology, topography, etc.

At the site scale, the developers have occupied most of the area adjacent to the seafront in order to build hotels and resort apartments. Many existing blocks in the central waterfront are very isolated from one another. At the same time, the enclosed units are isolated and have no spatial and functional connection with the urban context. This lack of integration results in a repetition of infrastructure and a decrease of open space.

To fill the missing link, the integration of the urban structure and the natural form must be encouraged in the development of Sanya city. If urbanization and natural structure can be linked through the agency of landscape³, and if housing development and open space can be integrated into one system, then the boundary between urban and nature, housing and open space will be blurred. In this hybrid system, all types of spaces are valuable because they are considered as parts of the system, and all the infrastructure and open space can be shared as a result of the integration of the system.



Concept of landscape as agency connecting isolated system



Figure-ground map of central seafront



Lack of understanding of the nature influence



No clear way of approaching nature impact



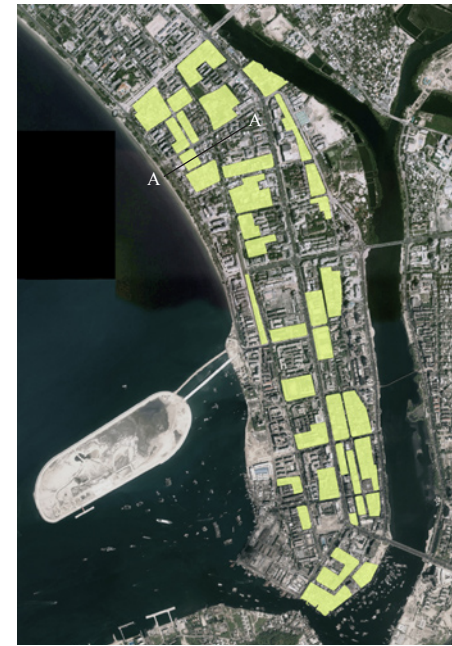
Isolated structure for development causes the mass and fragmentation of the existing central seafront

The missing links in the site

Currently, the layout and structure of the Sanya central waterfront in the existing site cannot connect with the natural structure and the urban context in any effective way. There is no reasonable model to guide the development and re-development of the central waterfront in terms of location, density and functional layout. The open space in the old residential area (urban village) could not be utilized while it was connected with urban systems; the foreshore development could not link the seafront to the city but set a barrier that separated the continuity of the waterfront open space system; the existing seafront space could not coordinate the transformation of Sanya city in terms of form and function.

Disconnection of the old residential zone from the urban system

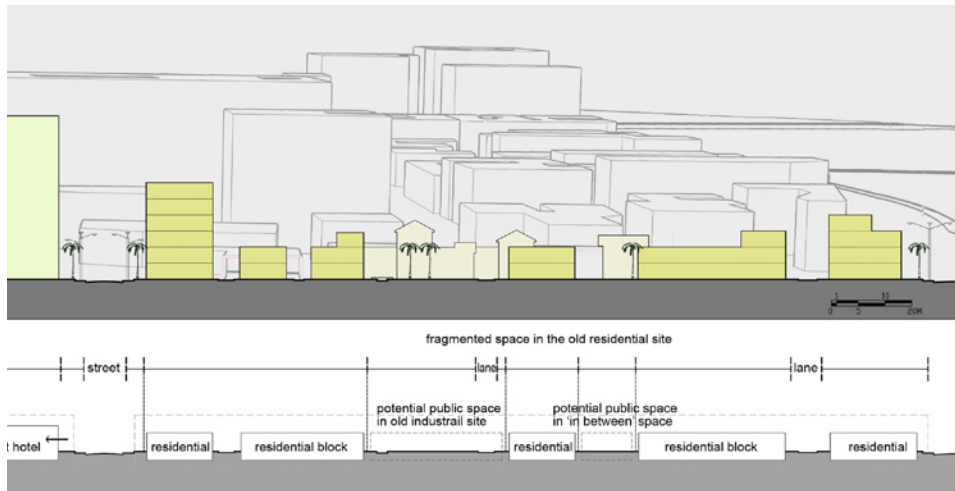
The old residential areas include old residential tenements, unused industrial sites and open spaces. These high-density areas occupy a big part of the central waterfront. The residents in this area are predominantly the old peasants and fishermen who keep strenuously trying to protect their land from being taken by developers and governments. In these untouched areas, in terms of identity and accessibility, the lack of communication with the outside urban context has resulted in these areas being isolated from the urban system. The fragments of no-longer-used industrial sites and the 'grey spaces' within have wasted a lot of open space and broken the continuity of the urban open space system.



Old residential zone allocation in central seafront



Existing Open-space limited in the seafront area



A-A section showing the existing conditions in the old residential area



Old residential area isolated from urban system



Local activities are getting disappeared



Fragments of abandoned open space

Disconnection of the newly developed resort zone from the urban fabric

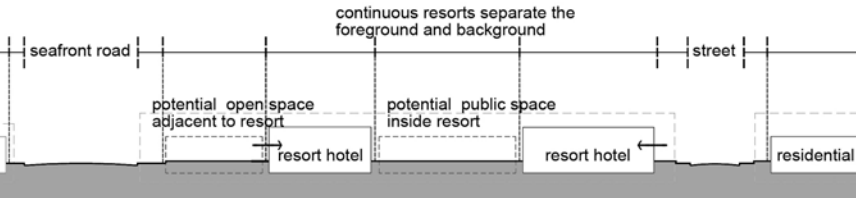
The foreshore resort zone is close to the seafront and the beach. Because of its valuable location, the developers are chasing every inch of land in order to build hotels and apartments. This development, despite selling itself as a ‘seafront’ development, does not actively engage with the seafront open space. The enclosed spaces of these resort units all have their own separate facilities (electricity and water) resulting in repetition rather than integration that would save space and cost. Furthermore, these temporal ⁴ buildings have formed a huge obstacle between the seafront open space and the urban context.



location of resort zones in foreshore area



A-A section showing the existing conditions in the foreshore resort zone



Continues resort buildings separate seafront from the urban background



Resort hotels and apartments occupy the front part of foreshore area



On-going resort development
Image from HNphoto.com.cn



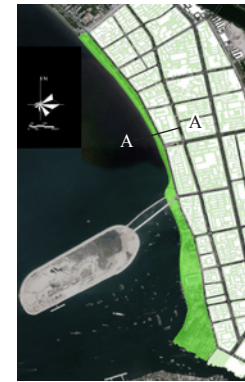
Narrow in-between space

Disconnection of the seafront open space from urban transformation

The seafront open space became the focus of the research because it plays a fundamental role in the transformation and development of the central waterfront and forms a crucial relationship to the middle ground (foreshore resort area) and background (old residential area) of the site. The current development is a simple combination of landscape elements (trees, seating, etc.) and no consideration has been given to the influence of background conditions. The poorly designed landscape and insufficient facilities in the seafront open space cannot address the transformation of the city. To be more valuable as the icon of a seafront city and more integrated with the urban context, the seafront open space development needs to engage more closely with its ecological, social and recreational values.

Research objective

The objective of this research is to form a structure that connects the natural landscape form with urban development, and create a model of the urban open space system within the structure. Through this research I will try to understand how landscape engages the layout of urban development, and how landscape acts as the link to drive the design of urban open space and create an integrated and adaptable system.



Left: Location and area of seafront openspace



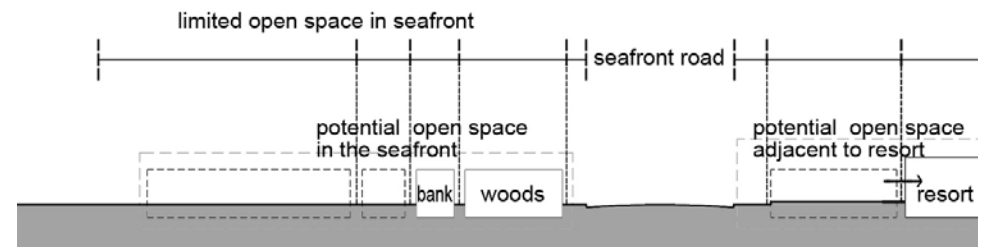
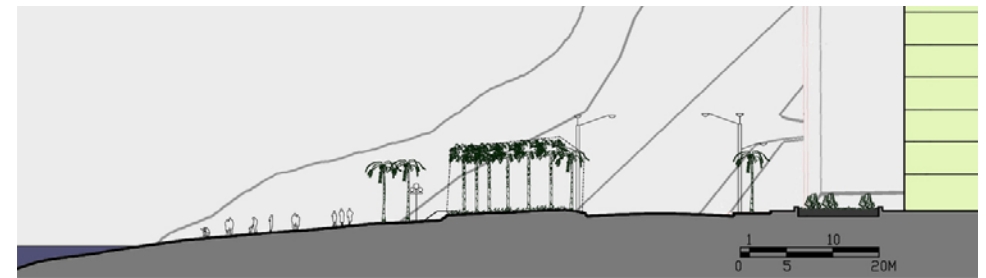
Right: Old resort type of seafront openspace cannot address urban transformation



Limited open space for urban recreation



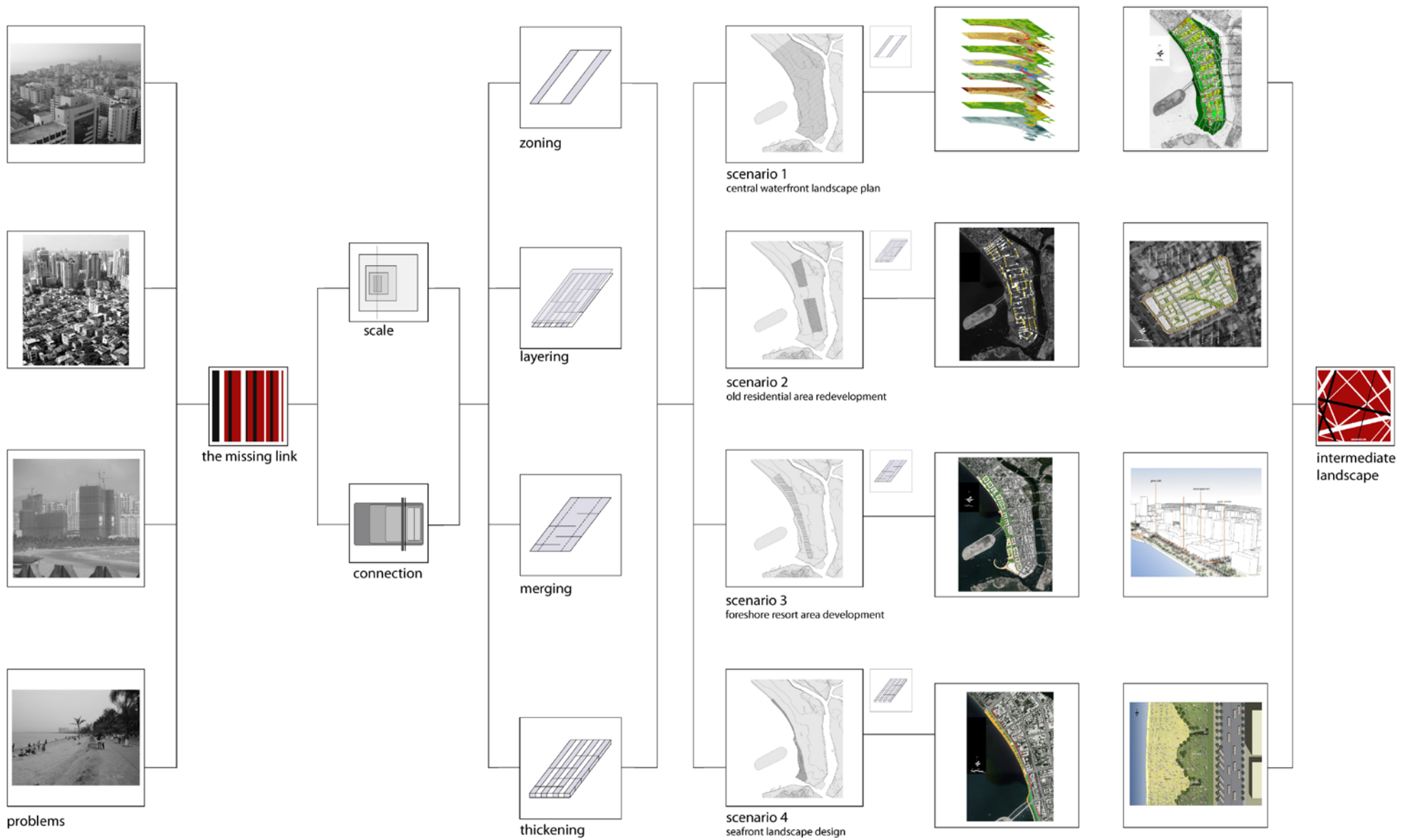
Simply make path to the beach



A-A section showing the existing resort type of seafront openspace

02. Concept

This chapter begins with an introduction of the concept 'intermediate landscape'. After a study of selected precedents and theories, the model of 'intermediate landscape' was developed which is made up by zoning, layering, merging and thickening.



Research structure

The concept of 'intermediate landscape'

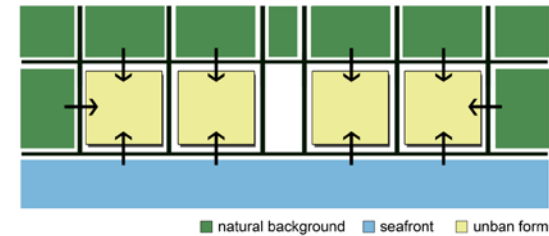
To develop the landscape framework for Sanya central waterfront, all aspects of urban development and renovation, open space form and a wider engagement with the seafront must be included. Since the problem with the central waterfront is about the missing link between the regional natural influence at a macro scale and the urban structure at the micro scale, the problem becomes a question of scale and connection.

“The intermediate scale concerns sites ranging from about 10 hectares to 1000 hectares in area, where the physical, economic and political complexities lead to unresolved landscape structures.” In the essay ‘Vers une nouvelle nature’, Christophe Girot stated, “It is probably the most difficult and ungracious of scales to work on because of the sheer complexity of the political and financial processes at stake ... it is also the most rewarding of scales because of its spatial dimensions and capacity to establish a durable landscape framework for our cities.”⁵

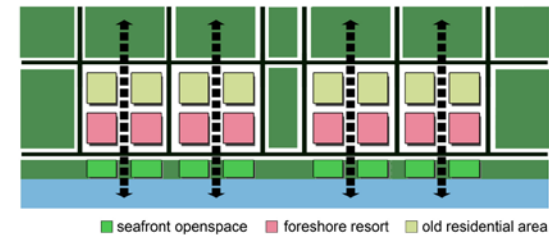
The term ‘intermediate scale’ has encouraged me to re-think the way I understand the term ‘landscape’ and its relationship to the urban environment. ‘Intermediate scale’ was introduced by Girot to describe a complicated combination of relationships within the urban context, while the ‘durable landscape framework’ is the solution to the ‘sheer complexity’ of the city. From Girot’s statement, the word ‘intermediate’ was quoted in this research to investigate the connectivity of landscape.

‘Intermediate scale’ = ‘inter’ + ‘mediate’ = ‘connection’ + ‘scale’. This research focused on the phrase ‘intermediate landscape’ to investigate the relationship between landscape and the connection across scales. The phrase is a concept that helps me to understand how to engage in urbanism through the design and operation of landscape. The ‘intermediate landscape’ does not mean a landscape in a specific scale but the landscape as an intermediate connection to fill the missing links within the urban context. For the research site, the intermediate landscape will not only make the seafront landscape system suitable at various scales, but will also provide a flexible form for urban development.

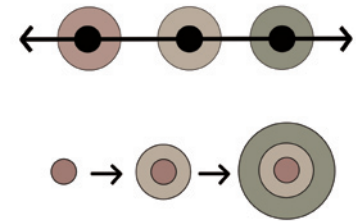
A selection of precedents and projects was studied to understand how they reflect the role of ‘scale’ and ‘connection’ in a landscape project design process in order to form the ‘intermediate landscape’ model.



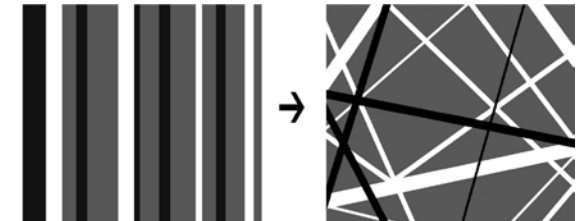
The missing link between regional natural influence and urban form at macro scale



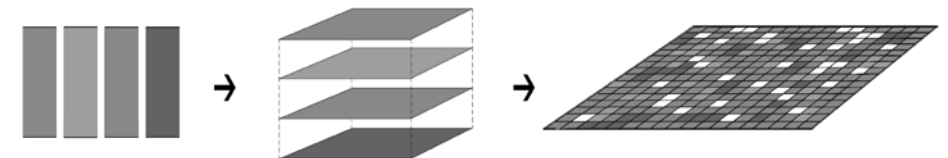
The missing link between isolated system in the urban context at micro scale



Concept of 'scale'



Concept of 'connection'



*Concept of 'intermediate landscape'
scale + connection = intermediate landscape*

Shifting force from zooming in and zooming out

*'Powers, less poetic, throw us into a realistic yet imaginary journey ... they resemble a direct view of forms and boundary surfaces...'*⁶

The science-based film Powers of Ten by Charles and Ray Eames is so flexible and adaptive that it can be understood in different ways and disciplines. "The aim was to convey a 'gut feeling' about the 'new physics,' and particularly about relative dimensions in time and space."⁷ In terms of landscape, the definition of the term 'scale' is well interpreted by Powers of Ten. Each moment of the movie defines a certain relationship in the one by one meter square.

'Scale is the relationship between the size of something in the map, plan, or model and its size in the real world'.⁸ When scale changes, the relationship between things will change accordingly. The authors use this movie to describe a series of relationships in different scales. Taking the park as the key element of the movie, five scales were chosen for the investigation of the changing relationship within the shifting scale.

- 10 X 10 meters: two people, the lawn within a park

One lazy afternoon in Chicago, after a picnic, a couple sleeps on the lawn of a park. The relationship in this scale is how the people engaged the space in the park.

- 100 X 100 meters: park, highway, vehicles, road, and boats

The couple are gradually lost in the site; the surrounding parts of the park come up. The type and content of the park is defined by the conditions of its perimeter.

- 1000 X 1000 meters: park, highway, lake shore drive, airstrip, museum, playing field, car park, boat docks, harbor

The park is recognized as a component of the infrastructure systems in the urban zone.

- 10000 X 10000 meters: the centre of the city, city districts, blocks, parks, waterfront, harbor, street and railway

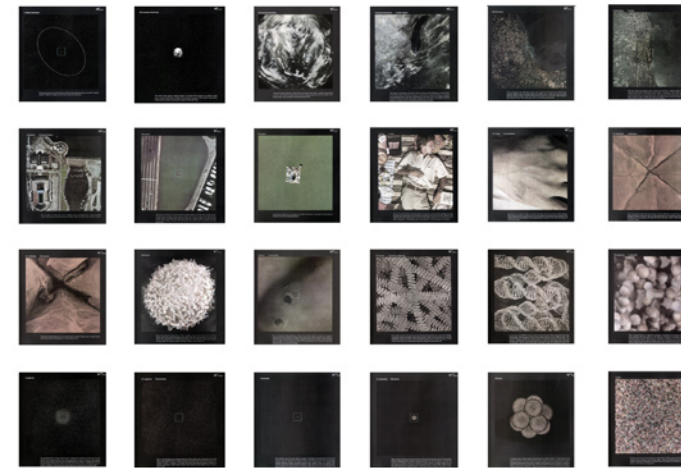
Urban functional zones are defined by the fabric of the city.

- 100000 X 100000 meters: metropolitan area, built-up area, lake

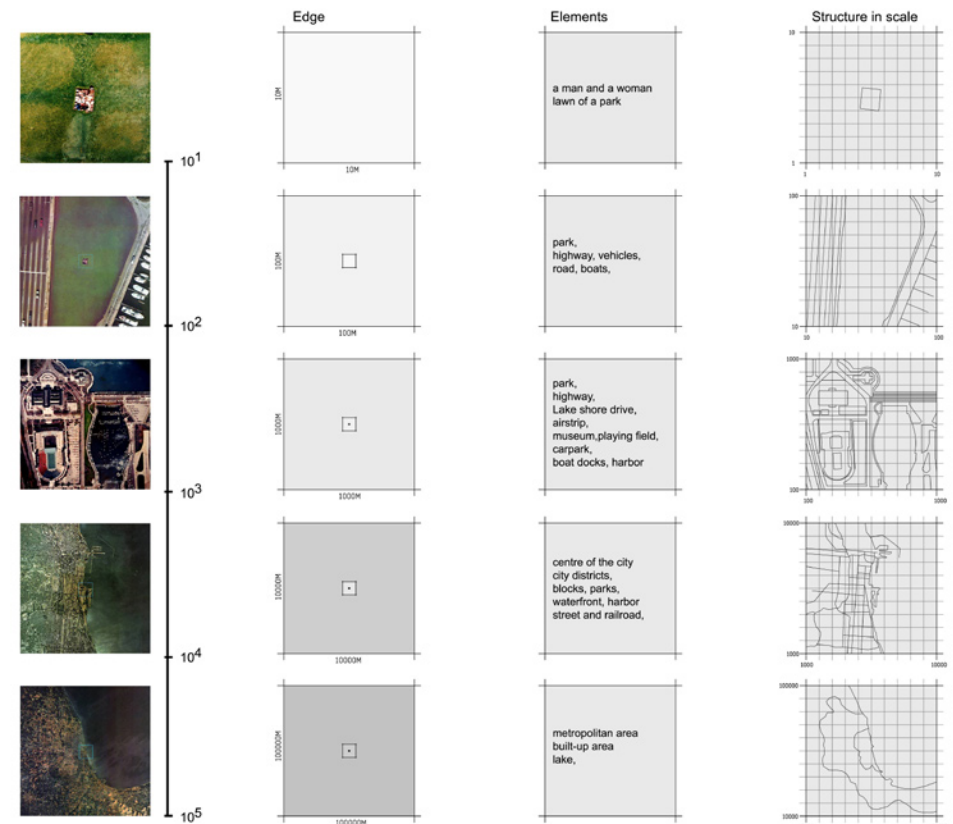
Built and inbuilt parts define the urban form and structure.

The shifting of the relationships – people with park, park with suburb, suburb with city and city with region – has formed the conditions for designing the landscape project while designing the city. When thinking across multiple scales simultaneously one will find a more comprehensive background and conditions to define the site, not like the 'limited scale and enclosed site' measure in the foreshore development of Sanya central waterfront. People with site, site with system, system with city and city with nature: can landscape act as an agent to form the relationship among these scales?

By borrowing the idea of powers of ten, the research will attempt to identify the forces at various scales from city and nature to form the waterfront renovation framework across a range of scales simultaneously. In this research, 'scale' will be the way to identify the missing links in the development of Sanya waterfront in terms of the spatial factor within at site scale, social and infrastructural factors at urban scale, and the ecological and topographic factors forming regional scale; 'scale' will also be a structural tool to form and sequence the research.



Images from
Movie: Powers of Ten



Research of Powers of Ten

'Scales' as the way of discovery

*'How does one know, in fact, the correctness and propriety of a particular spatial or material judgment? From where do these measures derive? ... From above, the various relationships among physical dimensions, human activities, natural forces, and cultural values can be seen to be as orderly, productive, and sophisticated as they are brutal and errant.'*⁹

In "Taking measures across the American landscape", James Corner introduced a new angle to recognize and understand landscape. By using aerial mapping to record the landscape in huge scales, the project indicated the abnormal relationship between nature and artificiality. Corner's diagrams, which are seen as the equivalent to the Powers of Ten, interpret the inherent connection between natural force and human beings across the macro scale to the micro scale.

However, Corner's drawings, maps and photos seem limited in the domain of finding and representing – they interpret the relationship of topography and function, and Corner does not propose a planning method to manage the land nor design the ground¹⁰. The diagrams in "Taking measures across the American landscape" seem as if they are the conclusion to the investigation. What will happen if we begin with these diagrams in a project to intervene rather than to discover? For a landscape project, can one prepare the overall ground from natural and social forces in the beginning, and then address the function and connection to the form?

In this research, rather than non-stop adjustments of a master plan such as that of the government, a landscape plan of the central waterfront will be established first, which will address the natural forces and cultural values from a macro scale. It will be used as a basis to guide and define the master plan and the spatial form of Sanya city.

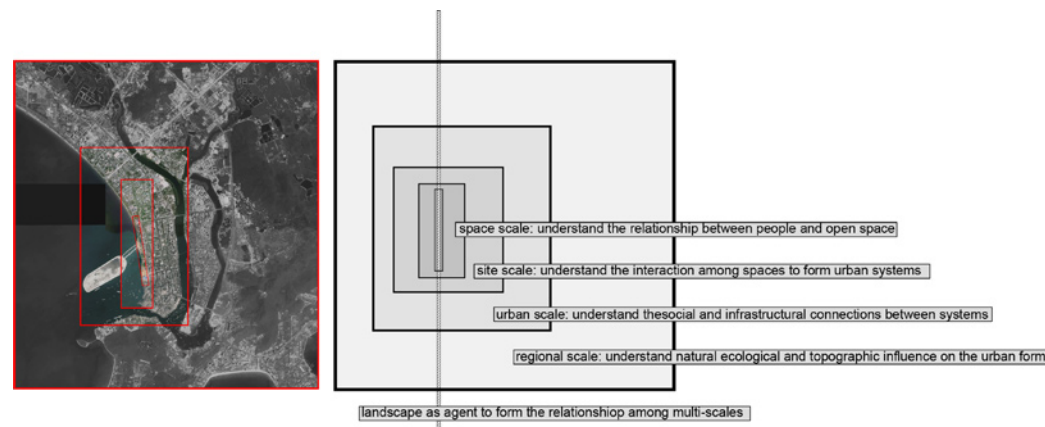
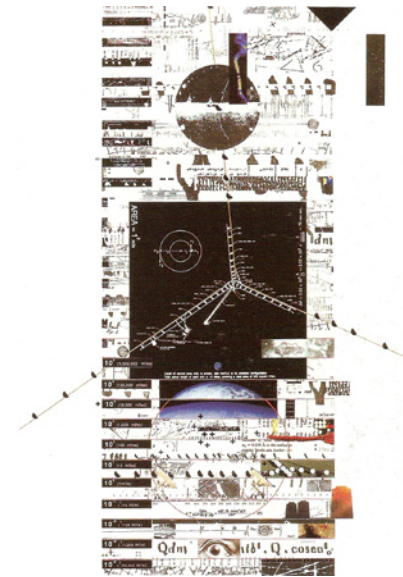
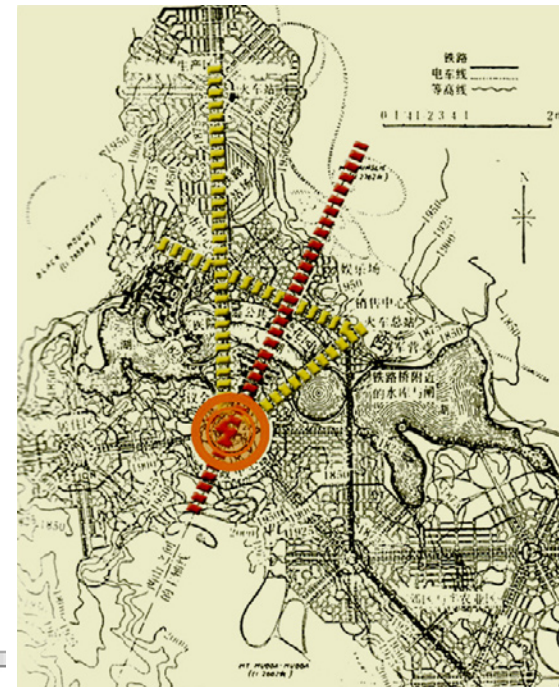


Diagram showing the concept of connecting multi-scales: addressing natural and social forces from macro to micro scales to form the structure of Sanya waterfront development



Powers of Ten II diagram
Image from: Taking measures across the American landscape



Canberra urban landscape structure

Translating natural topography structure into urban form. In Canberra plan, urban projects at micro scale adapted to the macro topography feature and form a sense of integration for the city.
Images form: China Urban planning and design academy



War memorial at Mt. Ainslie



Parliament



Capital Hill

The link between urbanization and natural values

*'We need nature as much in the city as in the countryside. In order to endure we must maintain the bounty of that great cornucopia which is our inheritance. It is clear that we must look deep to the values which we hold ... We need, not only a better view of man and nature, but a working method by which the least of us can ensure that the product of his works is more despoliation.'*¹¹

By carefully identifying and choosing the ecological and social values in the urban construction project, Mcharg created a composite map to represent the sum of physiographic opportunities and constraints. This ecological method is a reflection of social, resourceful and aesthetic values that translate the natural form into the urban development. Instead of 'providing a decorative background for humans' just like the measures from the Sanya government's planning theme, Mcharg suggested 'rediscovering nature's corollary of the unknown in the self, the source of meaning.'¹²

This precedent has led me to re-think the relationship between urbanization and nature. By 'design with nature', the natural values are translated into the social system, and a connection is established from the city to its inside and outside natural context.

In terms of the form of the waterfront development of Sanya city, by submerging the ecological method into the land-use plan it is more important than to flatter the 'nice view' of the natural background. To consider further, if the natural conditions such as its ecology, geology and topography, and the urban conditions such as density and circulation of Sanya city are considered as one integrated system, the natural influence would be embodied into the transformation of urban circumstance.

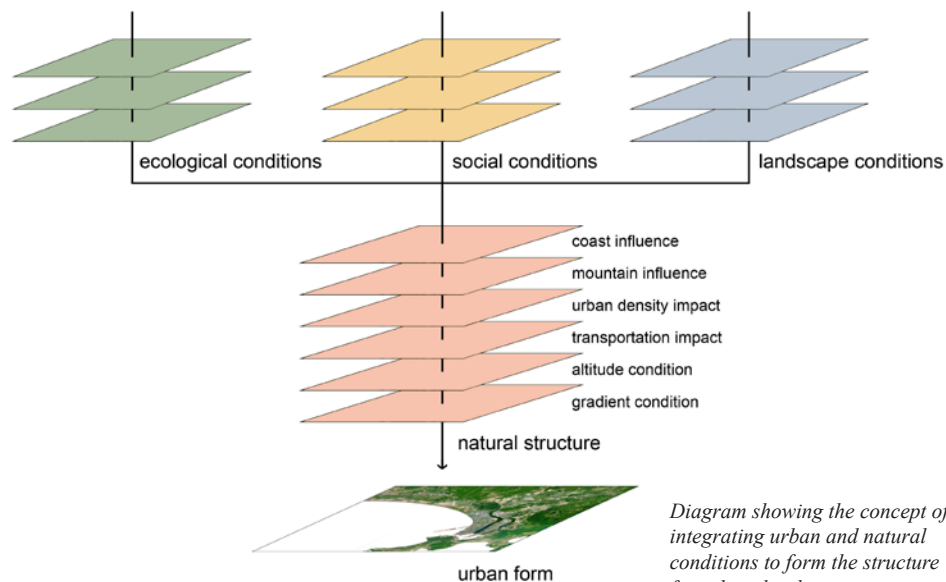
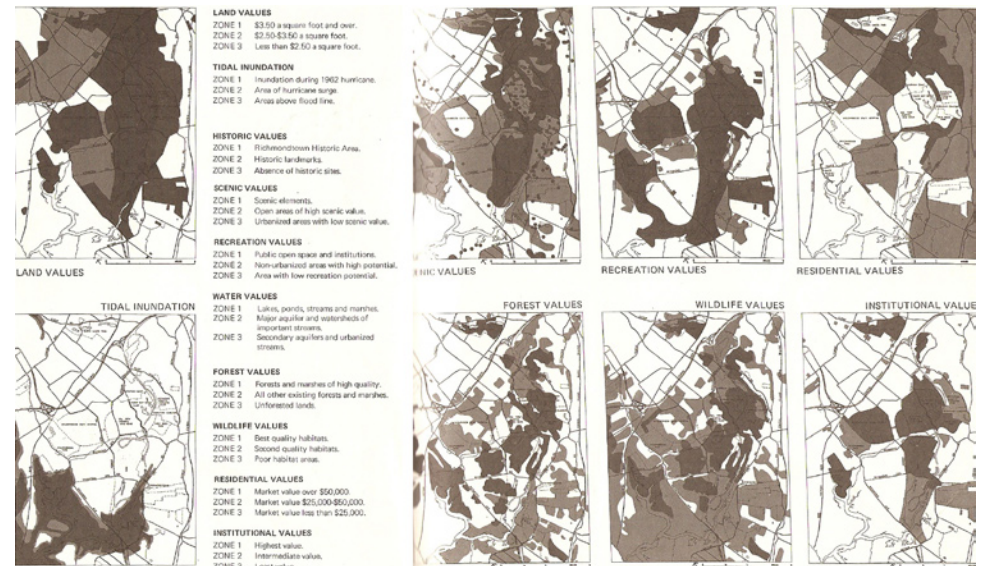


Diagram showing the concept of integrating urban and natural conditions to form the structure for urban development



*Nature in Metropolis
Image from: Design with nature*



Natural and social values system Image from: Design with nature



*Composition of all values
Image from: Design with nature*



Land-use plan under natural and social values system Image from: Design with nature

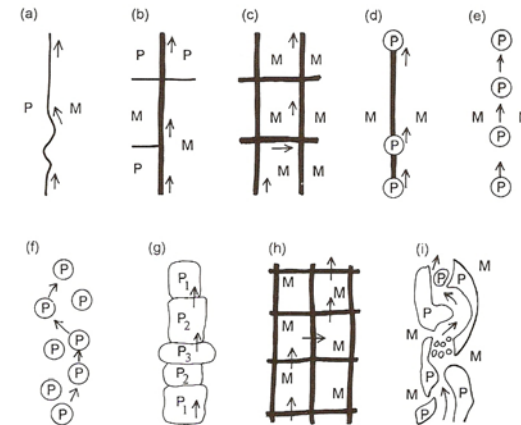
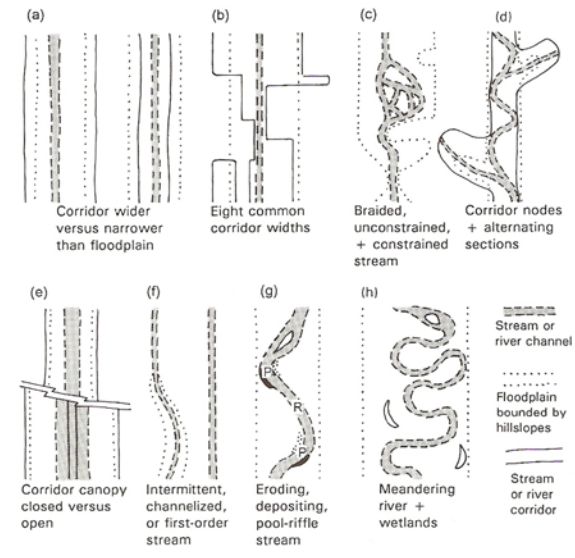
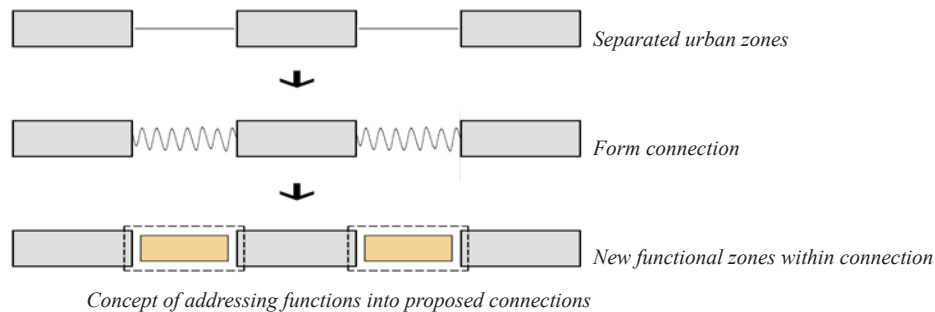
Continuity of ecology and landscape

'Animal, plants, water, wind, materials and people move through spatial patterns characteristic of virtually all landscapes and regions. This up-to-date synthesis explores the ecology of heterogeneous land areas, where natural processes and human activities spatially interact to produce an ever-changing mosaic. The subject is of enormous importance to today's society, and indeed for molding the future of areas surrounding each of us.'¹³

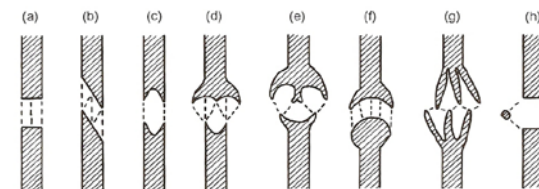
Forman outlined an ecological structure with 'mosaics and flows' through research into the types of corridors and patches, the investigation of the movement and flow of animals, plants, water, wind, materials and energy through the structure, and the analysis of enhancing movement across corridor gaps and non-adjacent elements. It provided a continuous spatial solution that focused on the ecological continuity for society's land-use objectives.¹⁴

In 'Land mosaics', Forman investigated the importance of ecological continuity that offers a more efficient eco-system. Through the study of flows and movement of natural elements, Forman conceived a continuous spatial linkage in the design of urban space.

This precedent gave me the idea that this continuity of ecology may still be useful when considering the way landscape operates in terms of how to maximize the ratio and capacity of urban open space. For the fragmented form in the Sanya central waterfront, by means of the investigation of the interaction between isolated urban space and its surrounding conditions, is it possible to transplant this ecological continuity into the urban landscape? If so, the continuity of landscape could be the key to connecting urban fragments in the Sanya central waterfront and forming a continuous and efficient urban environment.



Spatial arrangements from movements
Image from: Design with nature



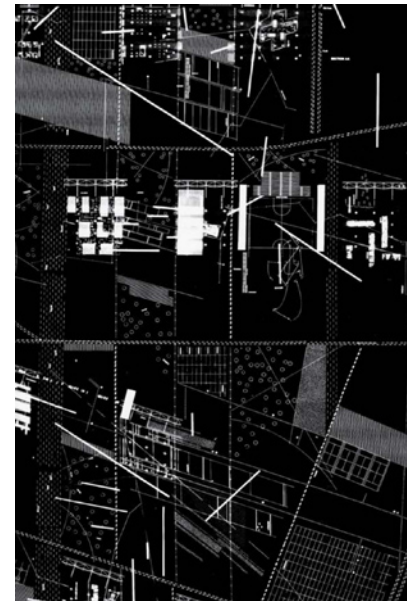
Enhancing movement across corridor gaps
Image from: Design with nature

Accommodate local contingency while maintaining overall continuity

*'Landscapes accommodate local contingency while maintaining overall continuity. In the design of highways, bridges, canals, or aqueducts, for example, an extensive catalog of strategies exist to accommodate irregularities in the terrain (doglegs, viaducts, cloverleaves, switchbacks, etc.), which are creatively employed to accommodate existing conditions while maintaining functional continuity.'*¹⁵

In the 'infrastructural urbanism', Allen introduced the concept of infrastructure in the design of urban architecture. The same as infrastructure, landscape has the ability to 'accommodate local contingency while maintaining overall continuity'. When considering landscape in a certain field it is important to consider the large scale and the small scale, the macro urban context and the site details. In the same way that infrastructure operates, landscape offers the connectivity that addresses the conditions from different scales.

In the foreshore resort development of Sanya central waterfront, in order to share these private units and link the seafront open space to the whole city, it is important to understand the forces and needs from local and overall scales and connect a localized design to a wider urban condition. How do we drive the forces from shifting scales and transform them into a form of foreshore resort development? How do we use landscape to form a connective system between the private space and its link with the public system? These questions encouraged me to consider how to operate landscape as a connective infrastructure.



*Proposed structure in the Logistical Activities Zone Competition
Image from: Points and Lines*



*Page from User's manual in the Logistical Activities Zone Competition
Image from: Points and Lines*

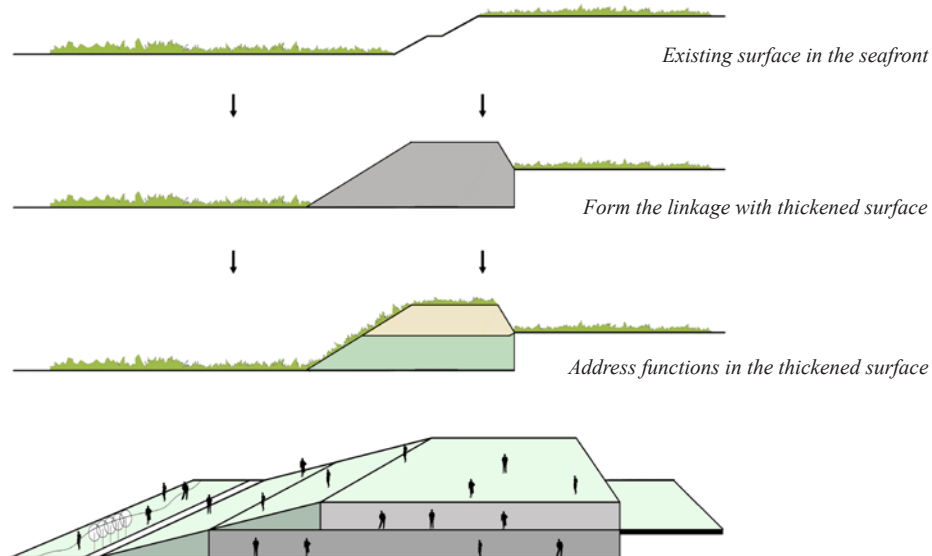
A dynamic urban surface

'The term landscape no longer refers to prospects of pastoral innocence ... it is the ground structure that organizes and supports a broad range of fixed and changing activities in the city.' ¹⁶

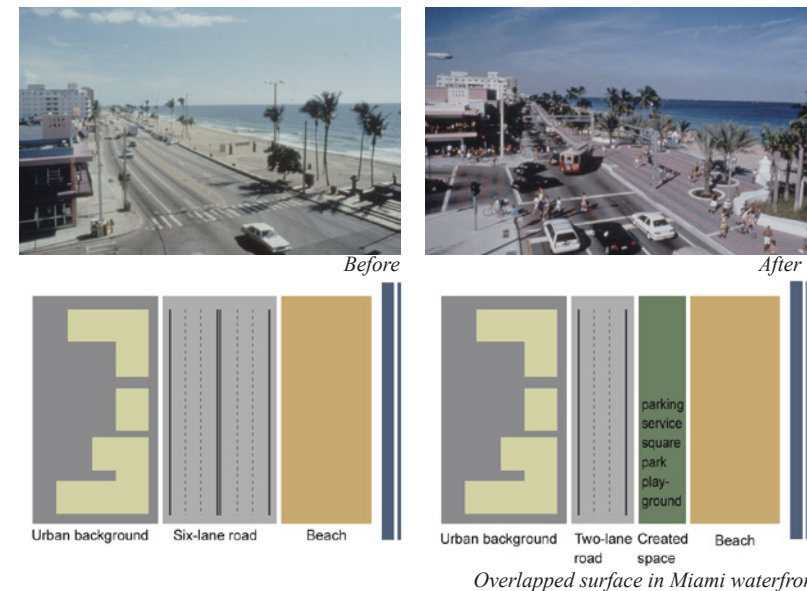
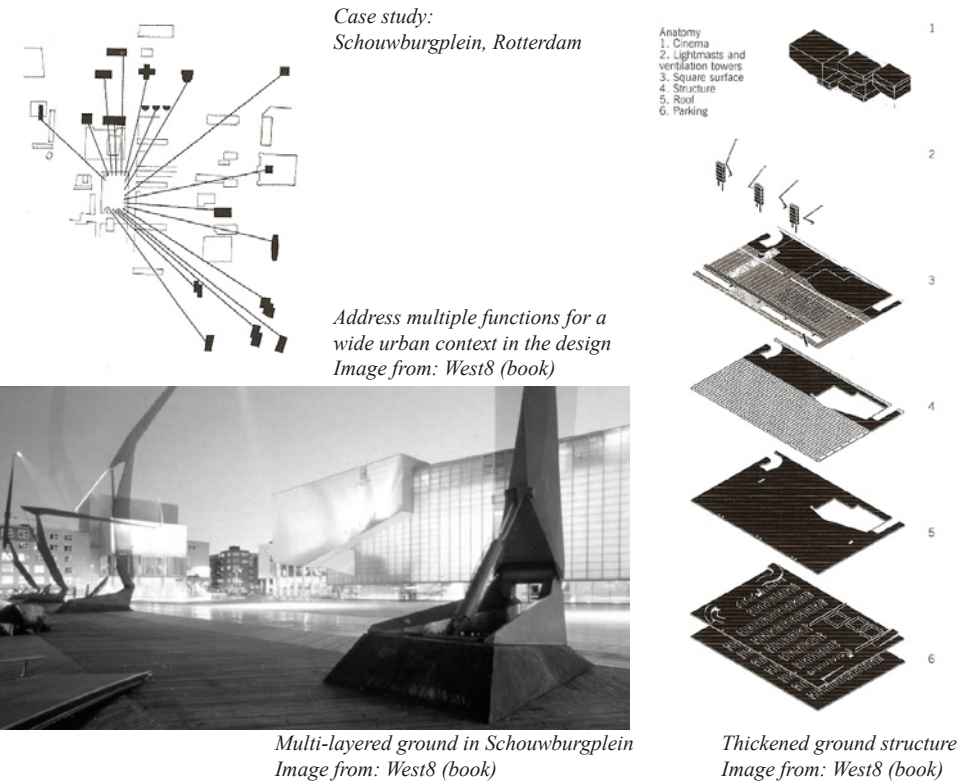
In the article 'programming the urban surface', Alex Wall has developed the synthetic and flexible concepts of landscape. He suggests landscape is no longer the pastoral scenery outside the city but the continuous urban surface used to address complex urban events. This article is a gateway that led me to a new field of modern landscape; it is also an index of modern landscape projects for me to understand how landscape operates as a dynamic urban surface.

In Schouwburgplein by West 8, which was introduced in the essay, the designer developed a thickened surface which increased the capacity of the site to multiply its range of uses. It is similar to the Miami waterfront project – the thickened boundary between road and beach has created a higher volume to address activity while at the same time connecting the sea-front to the urban background.

Facing limited open space in the Sanya central waterfront, how to increase the usage of open space to address more urban activities for the city is a problem in the waterfront re-development. A further problem involves how to use the thickened surface to create a dynamic and flexible open space along the seafront.



Concept of thickened surface in Sanya seafront open space





Location of indigenous seafront



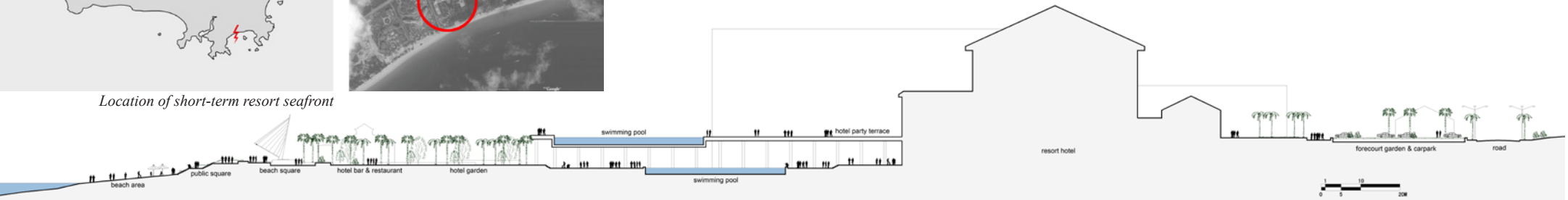
Section of indigenous seafront



Location of short-term resort seafront



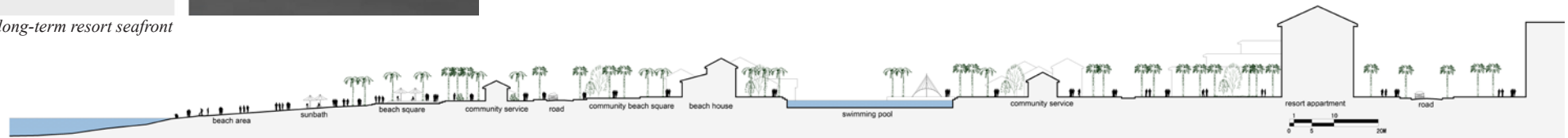
Section of short-term resort seafront



Location of long-term resort seafront



Section of long-term resort seafront



Location of tourism recreational seafront

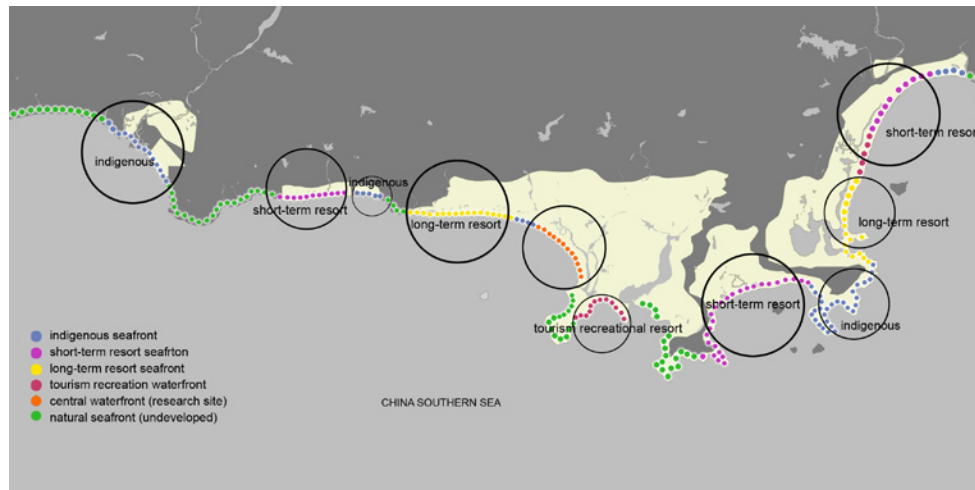


Section of tourism recreational seafront



Linkage study of Sanya regional seafront landscape

Currently, there are four typical types of seafront along Sanya's regional coast: the indigenous seafront, short-term resort seafront, long-term resort seafront and tourism recreational seafront.¹⁷ All of these seafront types are located in the rural area or the edge of the urban area, and they are all developed based on the beach resource. Without a wide study, including the urban context and edge conditions at urban scale, this case study focused on the site scale to investigate how these four types of seafront zones engage and connect themselves to the beach area.



Allocation of Sanya regional seafront types

Images of indigenous seafront



Casual market



Fishing activities



Seafood beach restaurant

Images of short-term resort seafront



Visual connection in the design of swimming pool



Public beach area is integrated into resort open space system



Spatial connection in the resort square

Images of long-term resort seafront



Resort seafront for temporal residents



Natural seafront with effective access

Images of tourism recreational seafront



Beach square in the tourism recreational seafront



Beach activities in the tourism recreational seafront

Linkage study of Sanya regional seafront landscape

Activity linkage in the indigenous seafront

Without planned structure, without designed landscape, the beach area is integrated as a part of the village through the everyday activities of the fishermen. Spontaneously, seafood restaurants were opened adjacent to the beach, casual markets came out along the beach, and the beach was also used as a public square for the fishermen of the village. Daily activities have linked the beach to the background in an effective way.

Spatial linkage in the short-term resort seafront

Although these isolated resort units don't offer much connection to the surrounding context, at their own enclosed site scale the outdoor space within the short-term resort are all well organized and have a systematic spatial linkage to the beach for their own users. With the consideration of visual connection in the design of swimming pool and squares, with the consideration of seafront spatial and visual effect in the allocation and style of bars and hotel restaurants, the public beach area was integrated into the resort zone as private space for the vacationers.

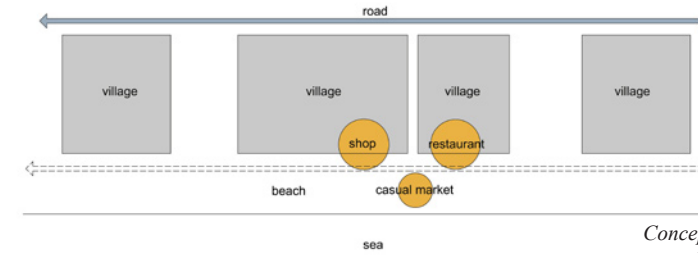
Access linkage in the long-term resort seafront

Because of the temporality in these resort residential areas, instead of a more artificial and functional seafront landscape that is expensive in terms of construction and maintenance, the designers chose to leave a natural seafront but create the most effective access to the seafront for the temporal residents. With the multi-entrance system in the seafront, the no-edge-defined private open space in the resort, the seafront space was linked to the resort open space as one system – people who live in the resort can engage with the seafront easily and comfortably.

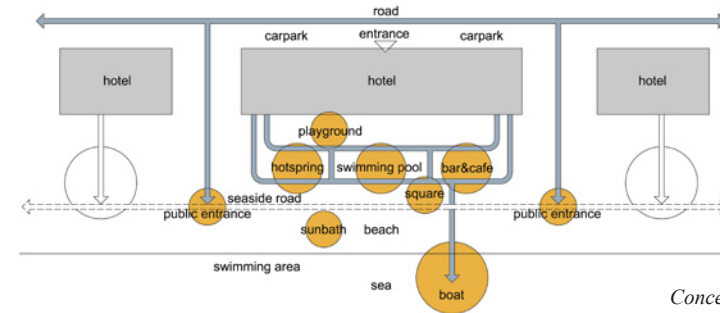
Circulation linkage in the tourism recreational seafront

In these remote recreational zones built for tourists and travelers, a systematic circulation was created to organize the recreational facilities such as diving, surfing, swimming, beach sports, beach shows and BBQs, etc. Just like the circulation system which leads customers to each product in a supermarket, the unrepeatable tourism circulation system has activated every possible piece of space in the beach area.

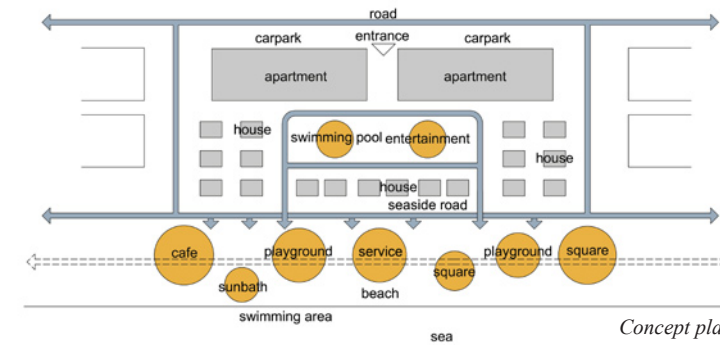
In conclusion, the activity, spatial, access and circulation linkage in the Sanya regional seafront areas offers their own particular connection to the seafront for their own users. In the landscape design in the central waterfront, how to identify the needs of different users and how to integrate the different linkages into one seafront landscape is the key question for the seafront landscape design.



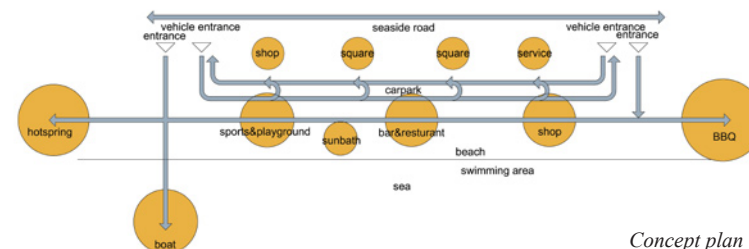
Concept plan of activity linkage in the indigenous seafront



Concept plan of spatial linkage in the short-term resort seafront



Concept plan of access linkage in the long-term resort seafront



Concept plan of circulation linkage in the tourism recreational seafront

Connective landscape in Geelong waterfront

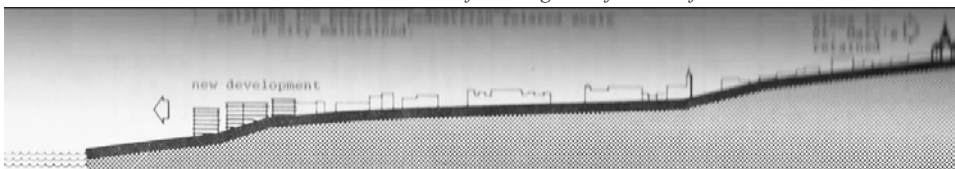
The intention in choosing the Geelong waterfront project as a case study is that Geelong city has a similar urban context to Sanya city in terms of the volume of the city, the transformation of urban functions and the urban topographic character. The Geelong waterfront is highly regarded as one of the most successful waterfront renovation projects in Australia, which has successfully created linkages between Corio Bay and Geelong city¹⁸, and set itself up as an icon for Geelong city.

According to the Geelong Regional Commission, the design strategy for the Geelong waterfront is to create linkages between Corio Bay and the City while defining a multi-purpose event space. 'It explores the manner in which the City meets its waterfront providing a diversity of edge conditions that allow people to experience water in a range of different ways ... the establishment of a grand civic-scaled promenade, a large receptacle of movement and a place of prospect. It is a place to walk up and down and view all forms of scenery.'¹⁹

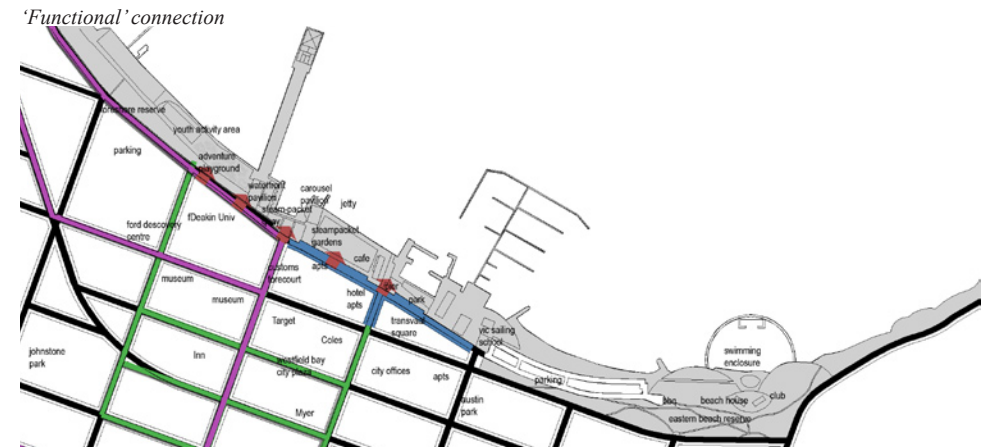
In this case study, rather than a comprehensive investigation of the project and Geelong city background, I focused on the linkage that was built by the landscape between the Geelong seafront and the city context.



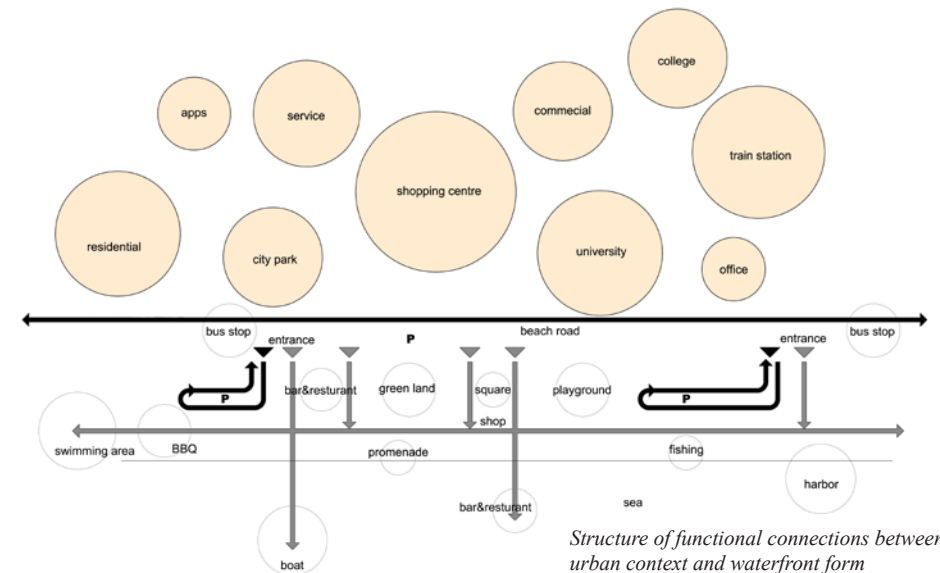
Aerial view of Geelong Waterfront: the foreshore and the urban context



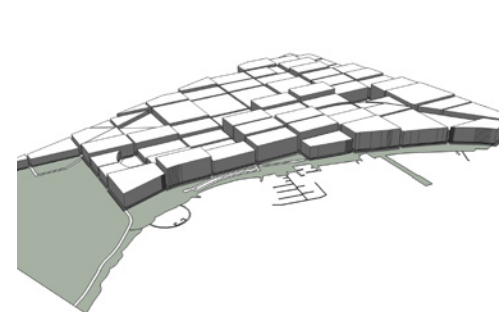
Geelong city topography character



Geelong waterfront structure



Structure of functional connections between urban context and waterfront form



Geelong city model



The location of park to address density

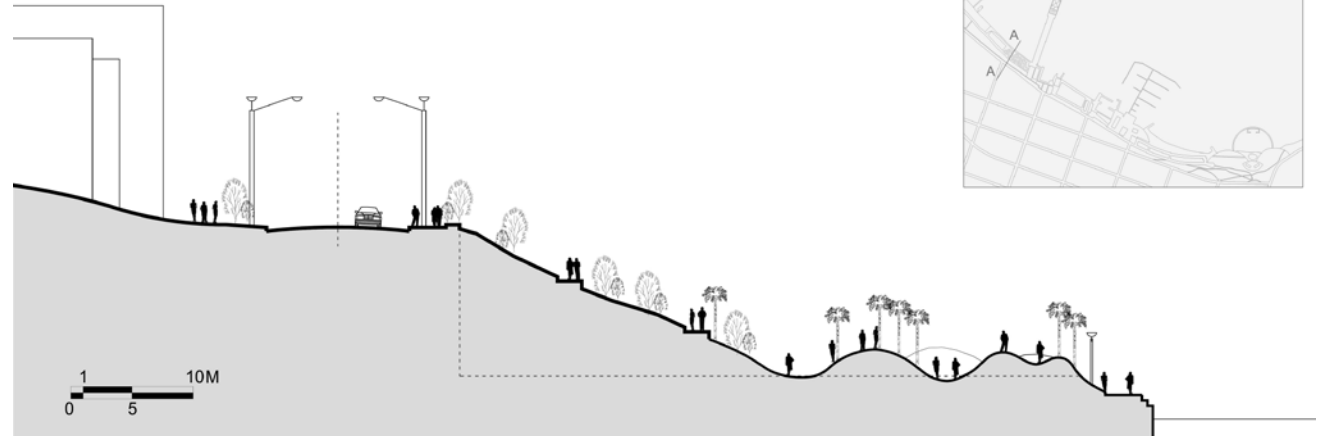
'Functional' connection

The functional layout of the waterfront has been systematically considered in the functional zones of Geelong city in terms of three parts. Firstly, most density addressing areas such as squares and parks are arranged in front of the CBD area, while the parking areas and some casual areas such as BBQs and swimming zones are located near the residential areas. Secondly, the layout is suitable for the adjacent part of the seafront, such as the youth activity area and adventure park that have been designed by Deakin University to address the needs of young people. Thirdly, the density flowing from the CBD was considered and addressed in terms of the entrance and nodes in the waterfront.

'Topographic' connection

Geelong is a sloping city and there are separations in the eastern and western part of the waterfront. By re-building the topography, the waterfront is functionally and visibly connected to the city. Sloping spaces connect the two levels of the city and the seafront and form a pedestrian access. Instead of flat topography, the 'waving' topography not only represents the marine culture of Geelong but has also re-organized the circulation and functional system.

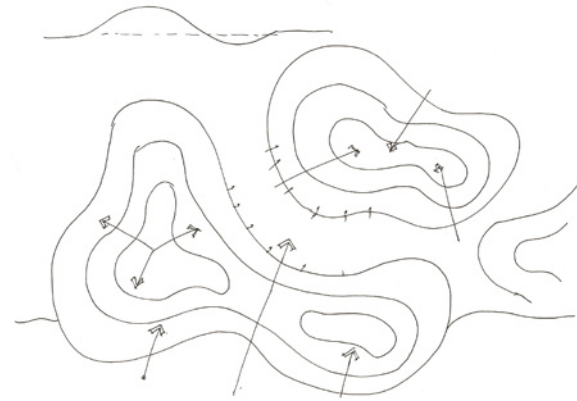
'Topographic' connection



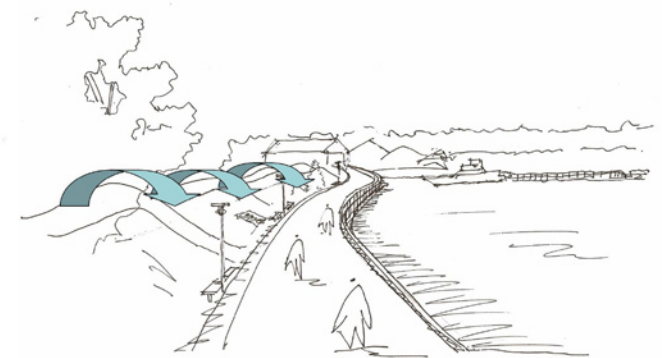
Section A-A: continuity of city topography in waterfront space



Topography features of waterfront that represent geelong city character



*Re-made topography to form space
- the playground area*



*Re-made topography to form space
- the seafront promenade*

'Infrastructural' connection

With a well-planned transport system around the seafront that will control speed and provide alternative routes during peak hour, it will be possible to create a flexible space that can support recreational activities.

'Visual' connection

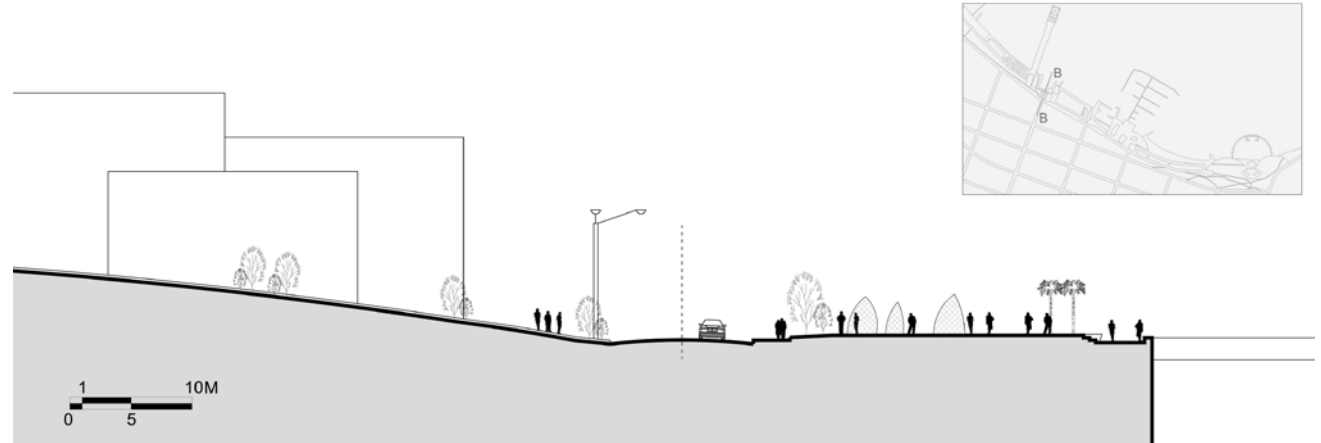
The sloping character of Geelong's topography has made the view the focus of the waterfront. The 'north sculpture' in the center of the waterfront has visibly linked the waterfront and the city in terms of its visual effects at different scales, while forming a special space pattern for the sea-front square.

'Infrastructural' connection

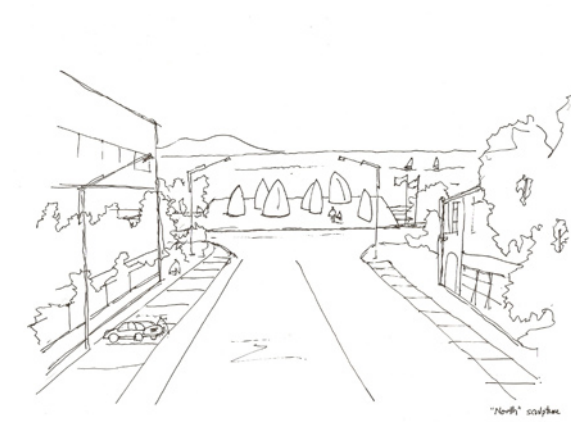


Traffic measures such as controlling speed and providing alternative routes to create flexible recreational space

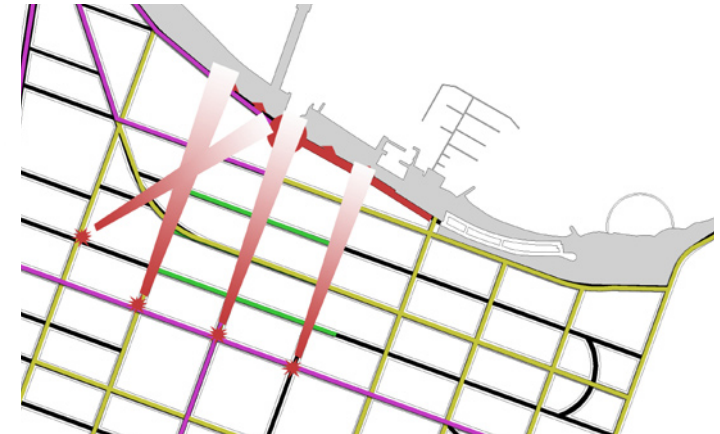
'Visual' connection



Section B-B : visual connection and space form in the waterfront



Waterfront as focus of view

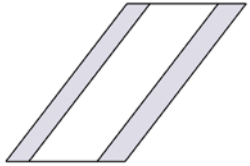


View connections from city



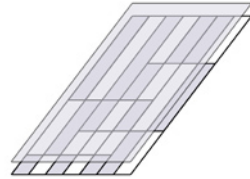
Visibly linked the waterfront and the city at different scales

Zoning



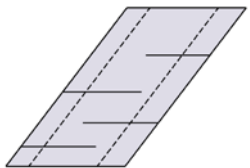
Zoning is to understand the role of landscape and ecology for urbanization on a regional scale and how it influences the structure of urban development.

Layering



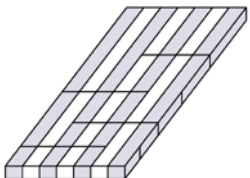
Layering is how landscape acts as a 'relational layer' that addresses urban fragmental spaces and links them into the urban open space system.

Merging

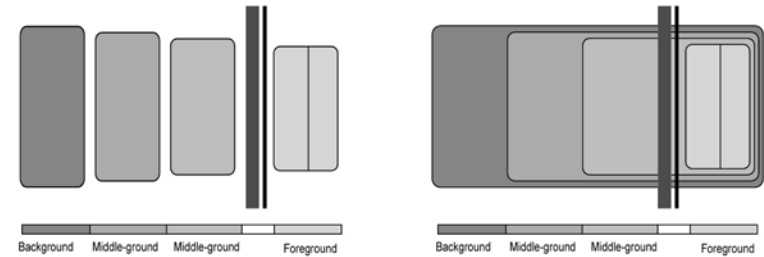


Merging is how landscape merges the separation between private space (semi-private) and public space and relates it to the public space system.

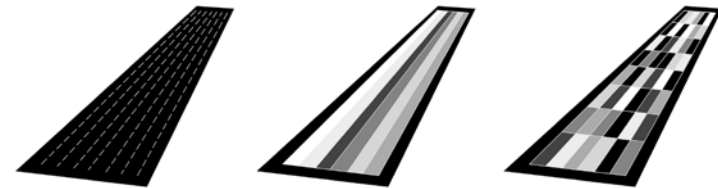
Thickening



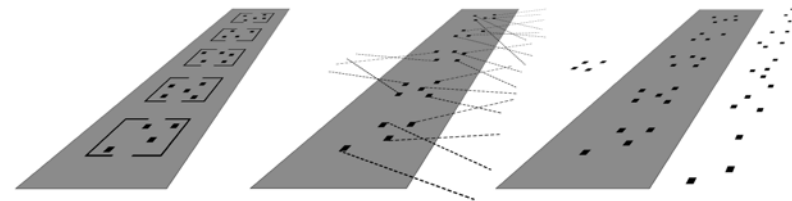
Thickening is to understand the operational role of landscape and how to increase capacity by thickening the urban surface.



Influence from multi-scales to form the structure of Sanya waterfront



Landscape as a relational layer to reorganize the layout of the enclosed old residential area



Landscape merging the boundaries between private resort units and urban public space



Thickened multi-layer seafront open space to address more functions and activities

Four concepts of 'intermediate landscape'

The precedents investigated above are all about how landscape acts as an operational tool that offers connectivity across scales. By quotation and expansion of the theories and precedents, the research was filtered through four concepts: zoning, layering, merging and thickening.

Zoning

Zoning is to understand the role of landscape and ecology for urbanization on a regional scale and how it influences the structure of urban development.

The form of the waterfront development is complicated in terms of pressure from social transformation and natural forces. By learning the social and natural value concept from 'Design with nature' and the macro thinking from 'taking measure across the American landscape', the 'zoning' concept was used to frame the urban form and the green system of the central waterfront.

This 'zoning' is not the traditional zoning about building height, lot coverage or flat ratio based on politics and economics, but a re-structure of the city in terms of ecological, geographic and landscape influences from natural conditions. The zoning concept is employed in the central waterfront landscape plan.

Layering

Layering is how landscape acts as a 'relational layer' that addresses urban fragmental spaces and links them into the urban open space system.

*'This relational thinking ... is a view that not only accords special attention to transitional and liminal spaces but also calls for the reading and designing of all landscape spaces as relative spaces.'*²⁰

The layering concept is abstracted from Forman's ecological continuity. The layering concept is conceived as landscape being a continuous layer which links the gap between urban fragments.

In the renovation of the old residential area in Sanya central waterfront, layering pushes the relationship between the fragmental space in the old residential zone and the surrounding context. By forming a continuous landscape layer, the existing gaps and separation between spaces will be filled, and an environment will be created where boundaries are blurred.

Merging

Merging is how landscape merges the separation between private space (semi-private) and public space and relates it to the public space system.

The merging concept comes from Stan Allen's infrastructural connectivity thinking in the design of architecture. The merging concept is employed in the foreshore development of Sanya central waterfront.

Merging offers a strong interaction between foreshore development and the open space system. The landscape will become an agent for the private space inside the resort zone and the outside public space. Through the merging of a continuous landscape, the overlapped space will be created in the private zone which links the urban open space system in terms of function, circulation and visual connection.

Thickening

Thickening is to understand the operational role of landscape and how to increase capacity by thickening the urban surface.

In 'programming the urban surface', Alex Wall suggested extending the continuity while diversifying the range of services in order to increase the capacity of the urban surface.

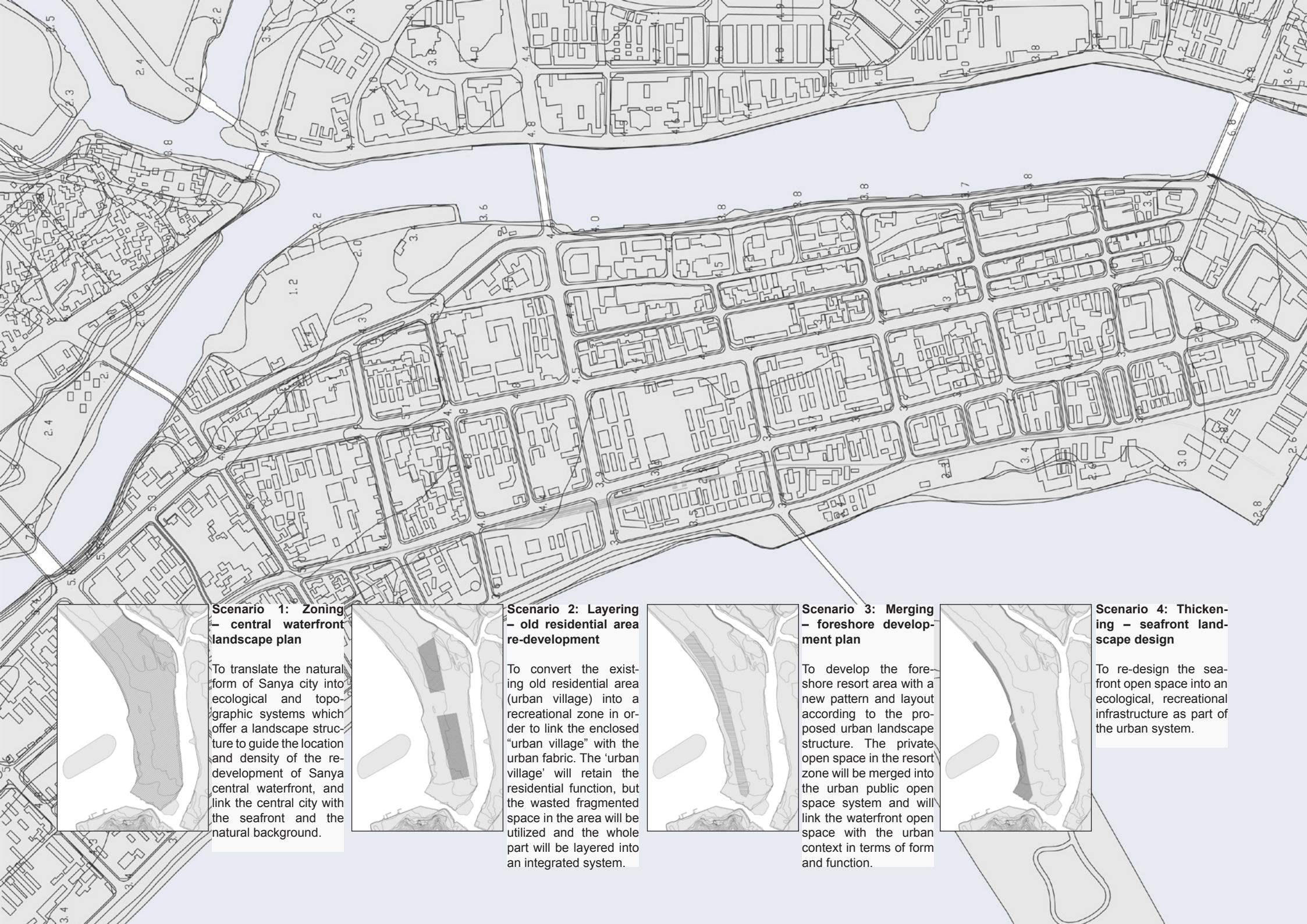
Through thickening to increase the capacity of open space, urban functions are addressed in a multi-layered landscape. Via the thickened ground, an urban environment is created where there is no clear definition of either system.

In seafront landscape design in Sanya central waterfront, the thickening concept is utilized to create an overlap of function where two or more systems can operate within the same space. This thickened surface is continuous, multiple and dynamic²¹ to address activities reflecting different needs, at the same time as it accommodates local contingencies and maintains overall continuity.

Zoning, layering, merging and thickening are the four techniques that form the intermediate landscape, and they interpret how intermediate landscape works as the connection across shifting scales in an urban context.

03. Scenarios

In this chapter, four scenarios were set up to test the 'intermediate landscape' concept. The central waterfront landscape plan has formed a structure for urban development in terms of land usage and the open space system in the 'zoning' scenario, and this open space system was detailed in the old residential area re-development, the foreshore resort development and the seafront landscape design in the 'layering', 'merging' and 'thickening' scenarios.



**Scenario 1: Zoning
– central waterfront
landscape plan**

To translate the natural form of Sanya city into ecological and topographic systems which offer a landscape structure to guide the location and density of the re-development of Sanya central waterfront, and link the central city with the seafront and the natural background.

**Scenario 2: Layering
– old residential area
re-development**

To convert the existing old residential area (urban village) into a recreational zone in order to link the enclosed "urban village" with the urban fabric. The 'urban village' will retain the residential function, but the wasted fragmented space in the area will be utilized and the whole part will be layered into an integrated system.

**Scenario 3: Merging
– foreshore develop-
ment plan**

To develop the foreshore resort area with a new pattern and layout according to the proposed urban landscape structure. The private open space in the resort zone will be merged into the urban public open space system and will link the waterfront open space with the urban context in terms of form and function.

**Scenario 4: Thickening
– seafront land-
scape design**

To re-design the seafront open space into an ecological, recreational infrastructure as part of the urban system.



Four scenarios

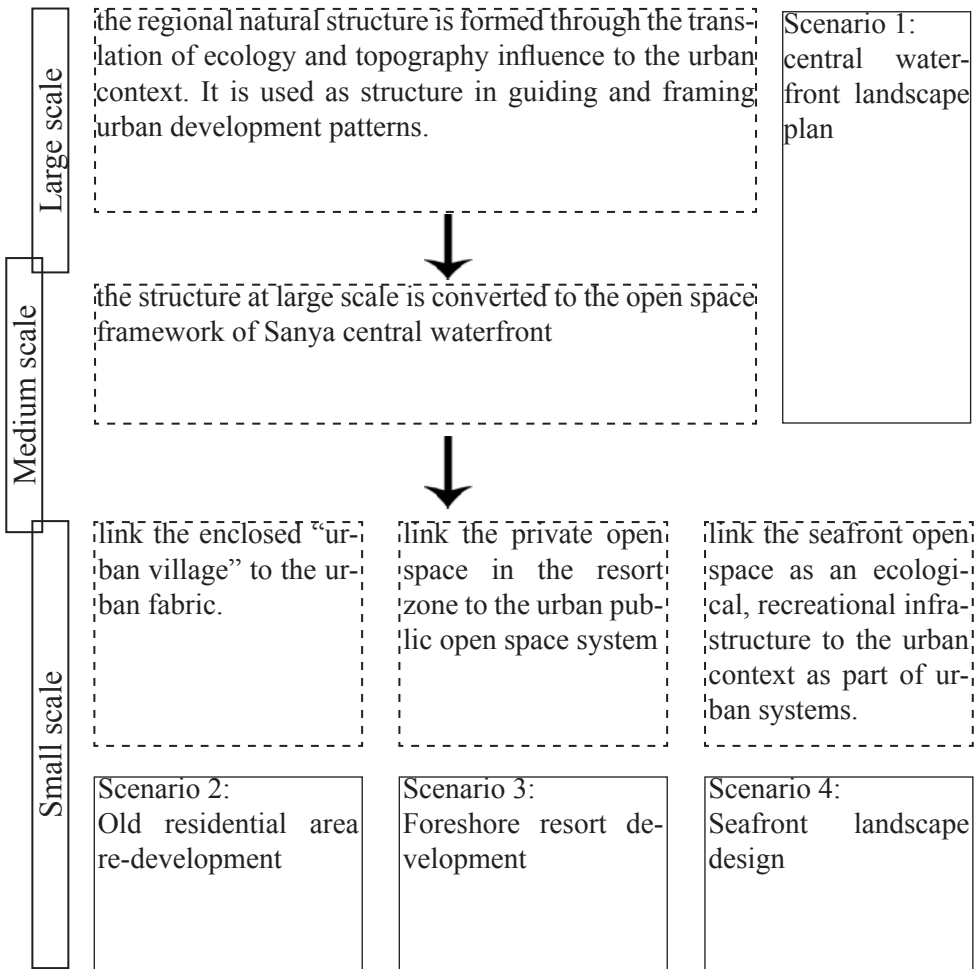
As discussed in the site investigation, because of a lack of understanding of the natural structure and its impact on urban development, there is no adaptable structure to address this impact. Understanding the influence of natural structure to the city is important in understanding the way it functions in terms of ecological, topographic and landscape conditions. When considering the site of the central waterfront, the 'attention' should be 'away from the object qualities of space (whether formal or scenic) to the systems that condition the distribution and density of urban form' ²².

To connect the missing link between the natural structure and urban development, the central waterfront landscape plan was conceived to approach the natural impact on urbanization. In this scenario, the zoning concept was tested to understand how the landscape and ecological conditions from the natural structure could influence the form of the central waterfront development.

In order to connect the missing links in the research site that were discussed in the site investigation, the landscape structure for waterfront development in the zoning scenario was translated into the landscape form in the research site. This landscape form was conceived in three scenarios – the old residential area re-development, the foreshore development plan and the seafront landscape design. The layering, merging and thickening concepts were tested in these scenarios to embody the regional landscape structure into the integrity and continuity of the urban landscape.

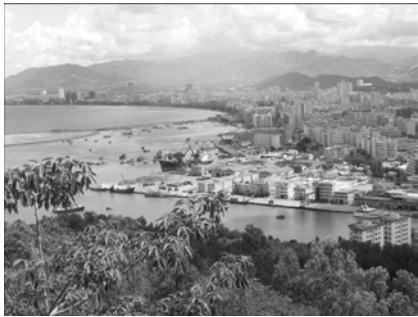
To explore how the four scenarios could be integrated into one system, the zoning, layering, merging and thickening scenarios were delivered at three scales: large, medium and small. At the large scale, the regional landscape plan was formed through the translation of ecology and topography to the urban context, and this landscape plan was used as an outline in guiding and framing urban development patterns. At the medium scale, the structure at the large scale was converted to the open space framework of the central waterfront in the zoning scenario. At the small scale, at three selected sites, three waterfront development models (layering, merging and thickening scenario) are proposed to detail the landscape framework into the urban space.

Each of the research scenarios offered a linkage through landscape: the zoning scenario provided an overall landscape plan for the central waterfront re-development which linked the natural structure to urbanization; the layering scenario linked the isolated fragmental space to the urban open space system; the merging scenario offered a functional and visual link from the enclosed resort space to the public space system; while the thickening scenario linked the seafront space to the urban context by a dynamic, continuous thickened ground. The set of projects not only acted at their own scale and context, but they also worked together as an integrated system across scales to form the overall form of Sanya city.

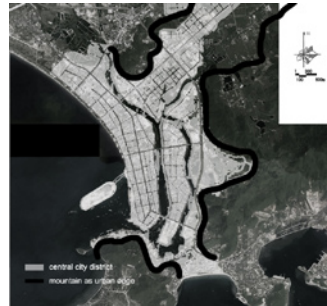
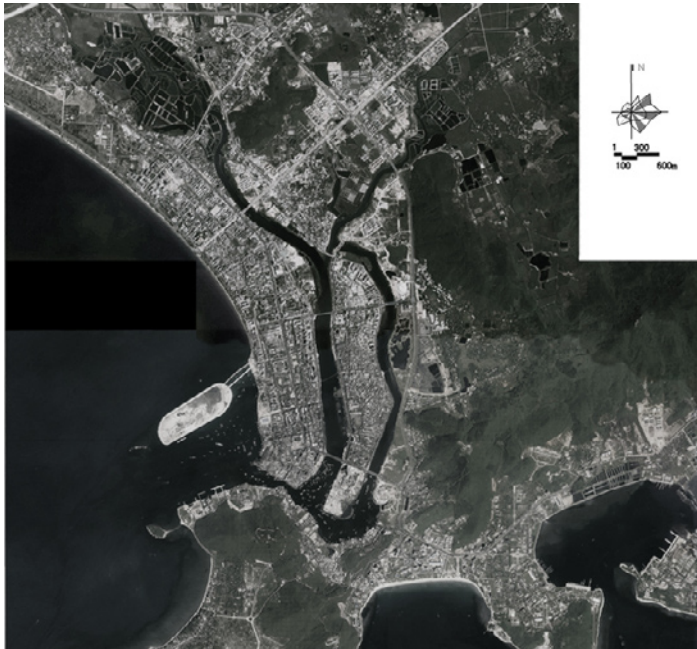




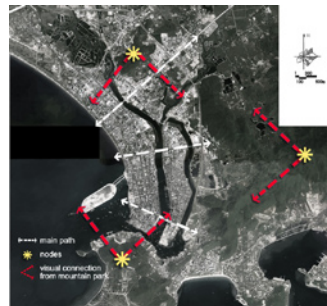
Mountain as background of the city



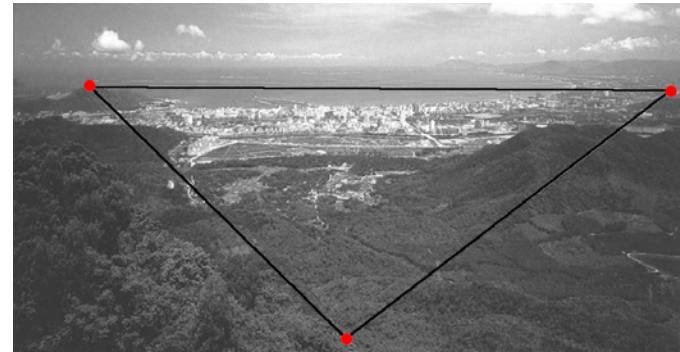
Seafront defines foreground of the city



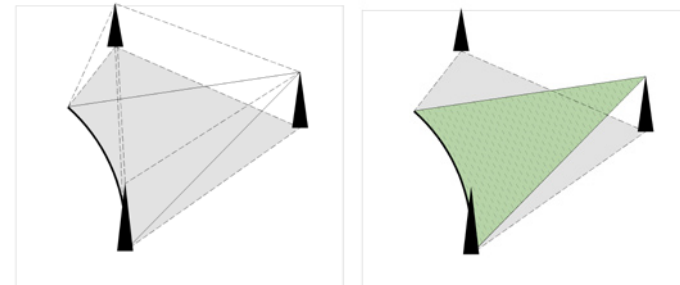
Mountain defining city edge



Seafront as concentration of urbanization



Giant triangle vertically defines urban form

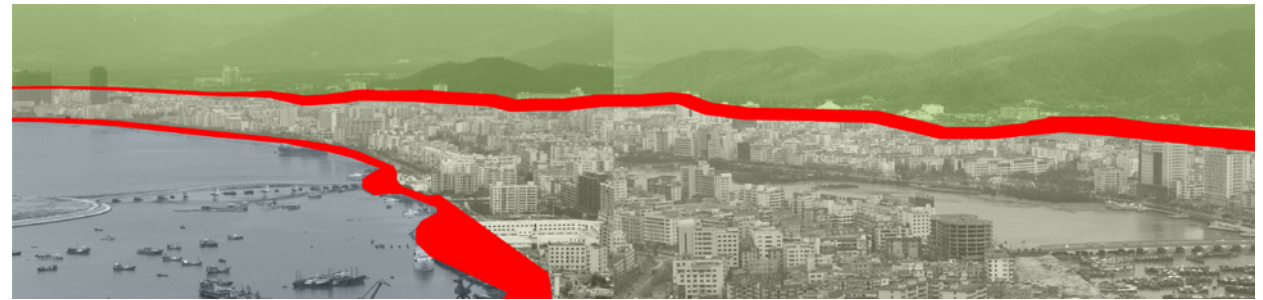
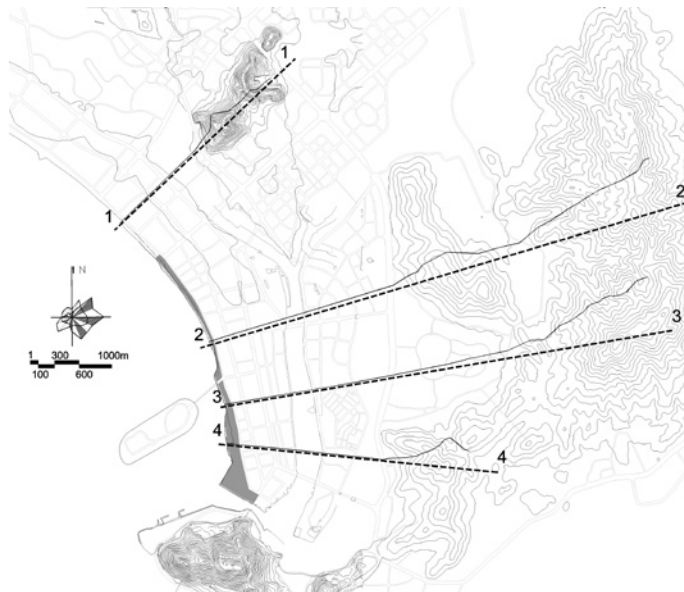


Relationship between seafront and urban form: the giant slope defines the urban form from waterfront to mountain background

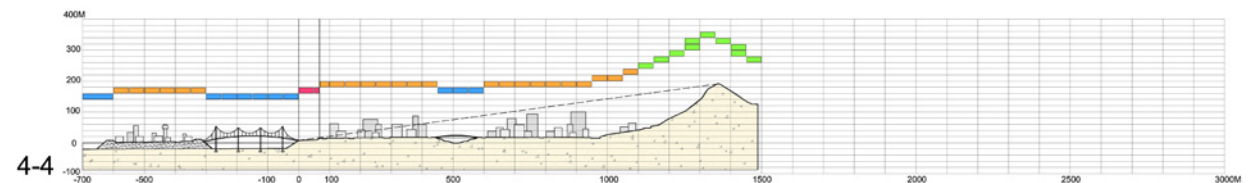
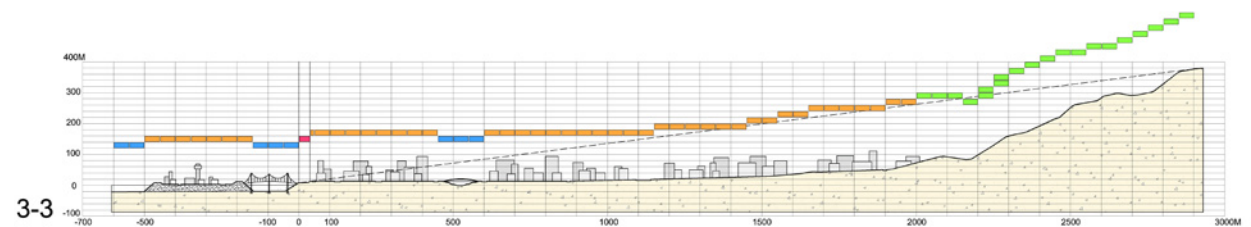
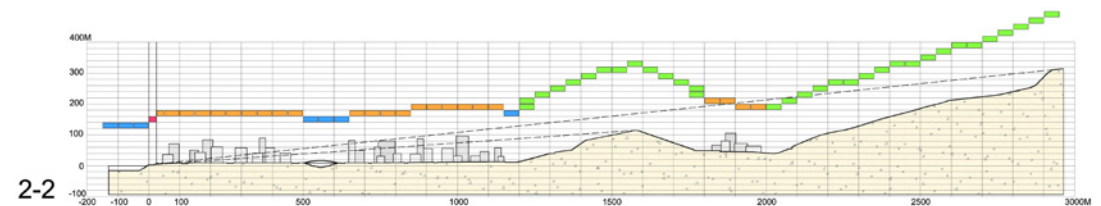
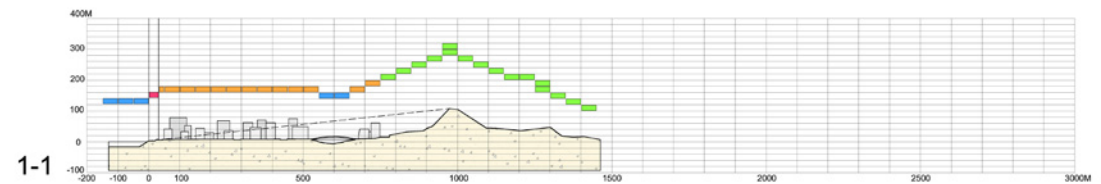
Zoning: central waterfront landscape plan

In order to understand the relationship between natural conditions and urban form, a regional topographic investigation was developed to analyze the natural influence on urban development in the early stage of the research. According to urban topographic features, Sanya city could be understood as three parts: foreground – the waterfront; middle ground – the hinterland; and background – the mountains. Horizontally, the waterfront and the mountains define the edge and layout of Sanya city. Vertically, the giant triangle that is formed by the surrounding mountains and the sloping topography are the key factors comprising the city form.

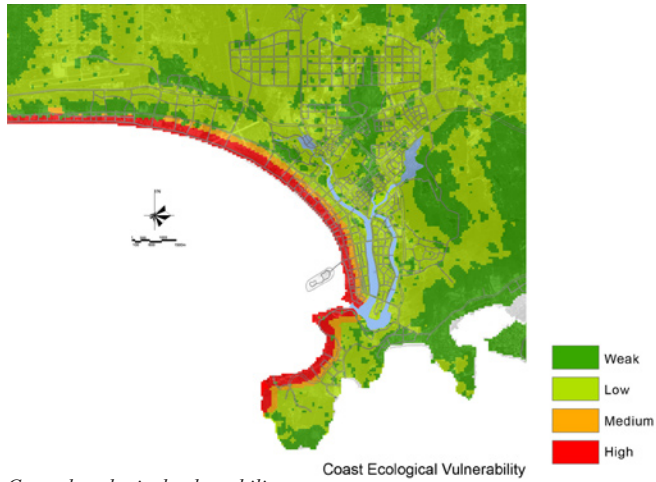
From the 'view linkage' study, the current connection between the urban area and its natural background is merely the three main roads through the city and mountain parks that can offer an overall city view. It has proved difficult to form a connection between the city and nature merely from 'appropriate building form' and 'view linkage' in the planning theme, because there is no inherent connection to intervene in the land use and open space structure of the city. However, the 'view' study is helpful to understanding the city in terms of the conditions of the seafront and mountain background topography.



Three parts of city defined by waterfront and mountain

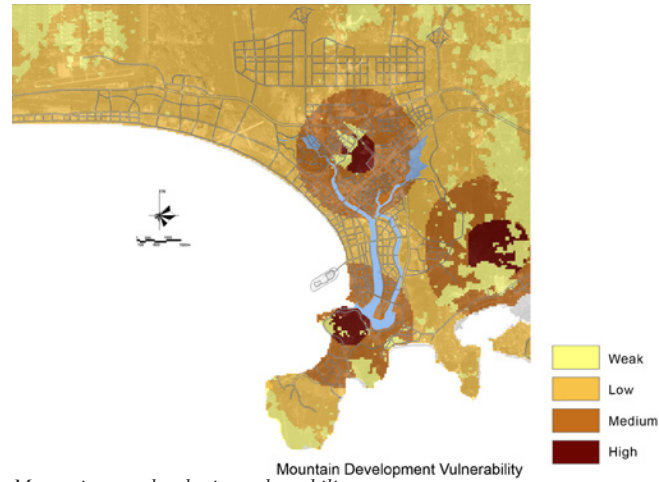


■ water ■ seafront ■ city ■ mountain
 Urban sections showing the relationship between urbanization and conditions of the seafront & mountain background topography



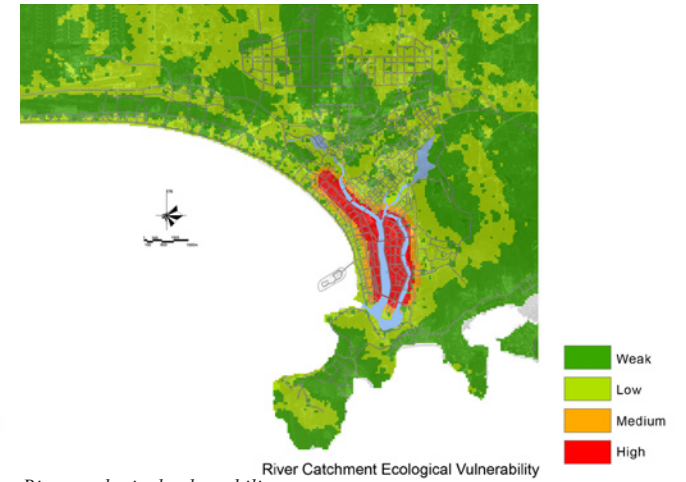
Coastal ecological vulnerability:

The regional ecological influence of Sanya city is from the coast, mountains and rivers. Because of the impact of tide and low land area, the closer to the coast, the higher the ecological vulnerability.



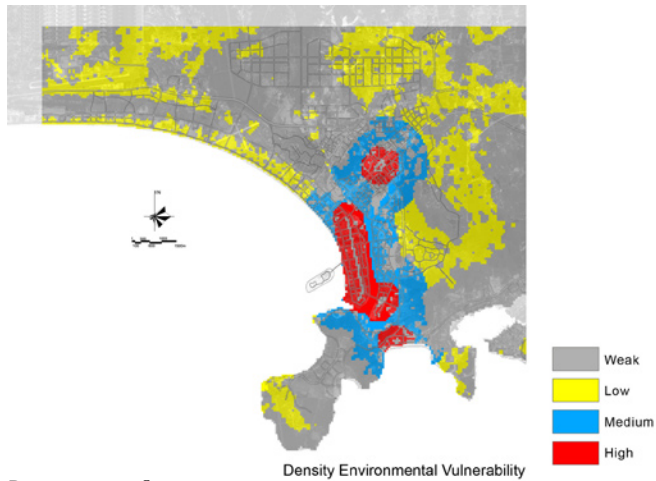
Mountain area developing vulnerability:

The urbanization of the mountain area depends on the altitude, gradient and geological quality. As shown in the diagram, the darkest color stands for the most vulnerable area for urbanization.



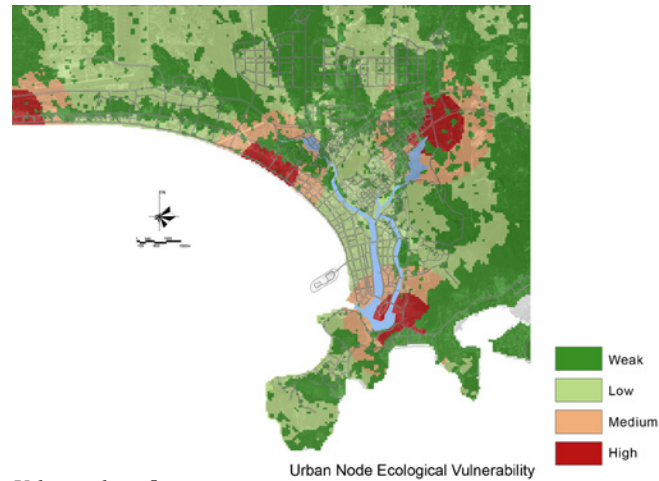
River ecological vulnerability:

The further from the river, the ecological vulnerability is lower because there is less influence from the river such as flood levels, land stability, and the influence of flora and fauna.



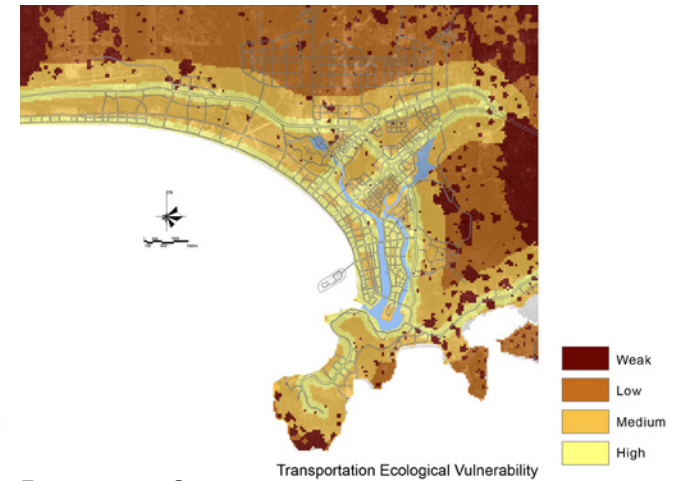
Density zone influence:

The area with high urban density is identified as the key factor to ecology. Based on the influential area and the distance from density and human activity, a series of ecological vulnerability degrees are shown in the diagram.



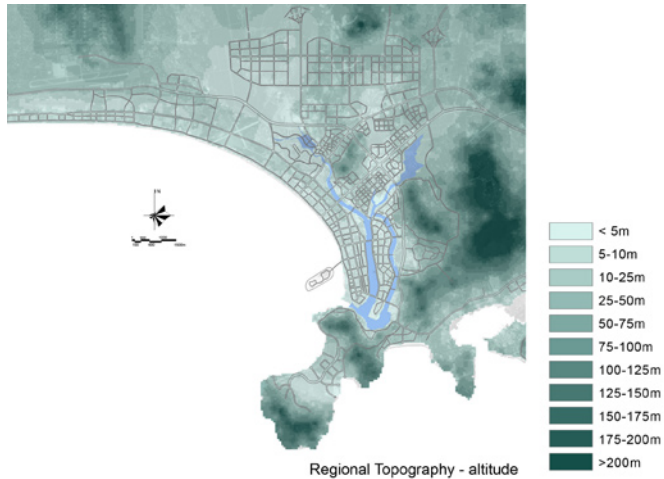
Urban nodes influence:

The geologically weak zones are identified as a potential security factor for urbanization. Based on distance from these nodes (associated with terrain, land and wind features), a series of ecological vulnerability degrees are shown in the diagram.



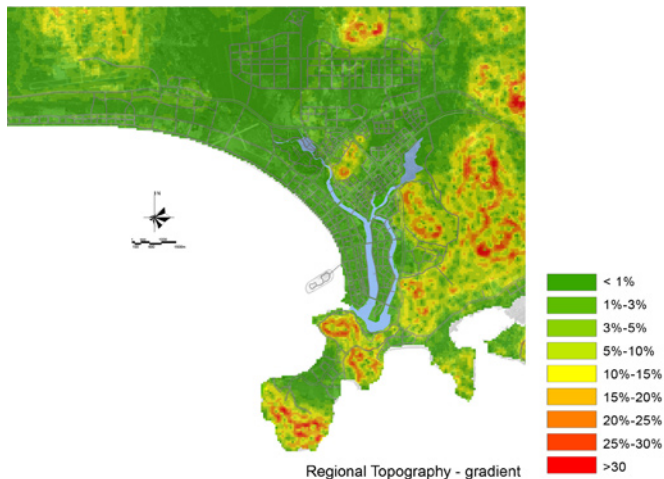
Transportation influence:

Urban transportation systems influence ecology in terms of noise, air pollution, etc. Based on distance to roads and level of transportation, the series of ecological vulnerability degrees are shown in the diagram.



Altitude condition:

In the mountainous area, the higher the land level, the higher vulnerability it has.



Gradient condition:

The ecological vulnerability is higher when the land is steeper.

At the large scale, through the 'zoning' concept a regional ecological and landscape values system was established to store, overlay and analyze layers of natural and social data. Three groups of information were collected and sorted at a regional scale: the ecological vulnerability influence from coasts, rivers and mountains in four levels; the social impact from the density zone, urban node and transportation influence in four degrees; topographical conditions from altitude and gradient.

01. Coastal ecological vulnerability: The regional ecological influence of Sanya city is from the coast, mountains and rivers. Because of the impact of tide and low land area, the closer to the coast, the higher the ecological vulnerability.

02. Mountain area developing vulnerability: The urbanization of the mountain area depends on the altitude, gradient and geological quality. As shown in the diagram, the darkest color stands for the most vulnerable area for urbanization.

03. River ecological vulnerability: The further from the river, the ecological vulnerability is lower because there is less influence from the river such as flood levels, land stability, and the influence of flora and fauna.

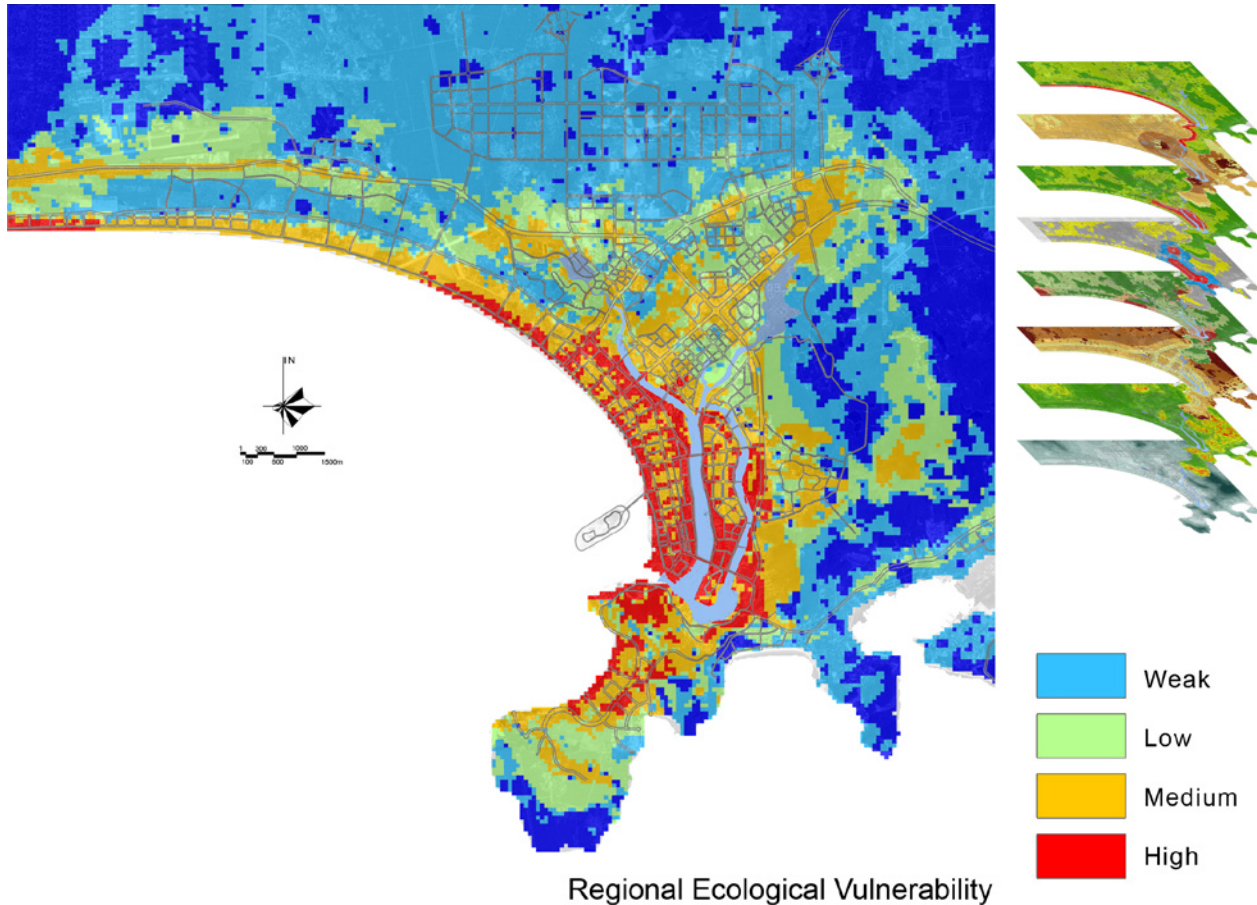
04. Density zone influence: The area with high urban density is identified as the key factor to ecology. Based on the influential area and the distance from density and human activity, a series of ecological vulnerability degrees are shown in the diagram.

05. Urban nodes influence: The geologically weak zones are identified as a potential security factor for urbanization. Based on distance from these nodes (associated with terrain, land and wind features), a series of ecological vulnerability degrees are shown in the diagram.

06. Transportation influence: Urban transportation systems influence ecology in terms of noise, air pollution, etc. Based on distance to roads and level of transportation, the series of ecological vulnerability degrees are shown in the diagram.

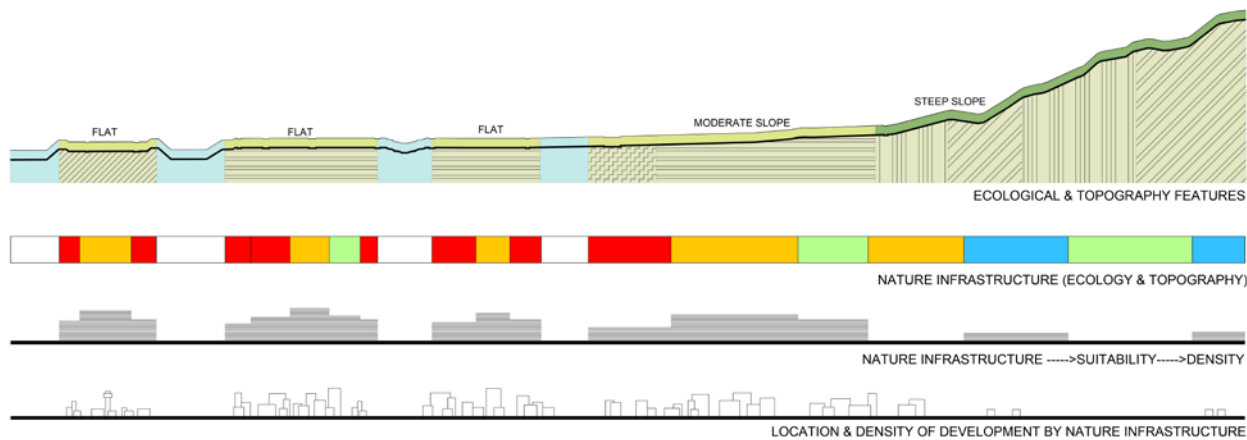
07. Altitude condition: In the mountainous area, the higher the land level, the higher vulnerability it has.

08. Gradient condition: The ecological vulnerability is higher when the land is steeper.

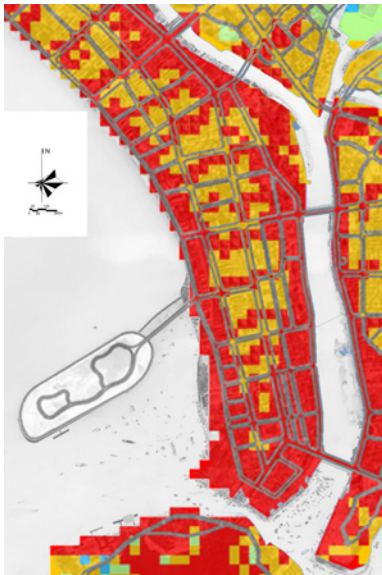


By overlapping the ecological factors from the eight sectors, a regional ecological vulnerability system was built in four levels: the most ecologically vulnerable area (High); the medium ecologically vulnerable area (Medium); the low ecologically vulnerable area (Low); and the least ecologically vulnerable area (Weak).

This system can be understood as a 'natural infrastructure' to guide urbanization. Different degrees of ecological vulnerability are translated to the different standards of development: the weak area is reserved as urban background, the low vulnerable area is for high-density development, the medium vulnerable area is for middle density urbanization, and the most sensitive area is restricted for low-density development as an urban green system.



Nature infrastructure translates nature form into urbanization form



*Nature infrastructure of central seafront
Ecological influence on the structure of central city.*



*Central waterfront figure-ground structure
Urban form from nature infrastructure.*



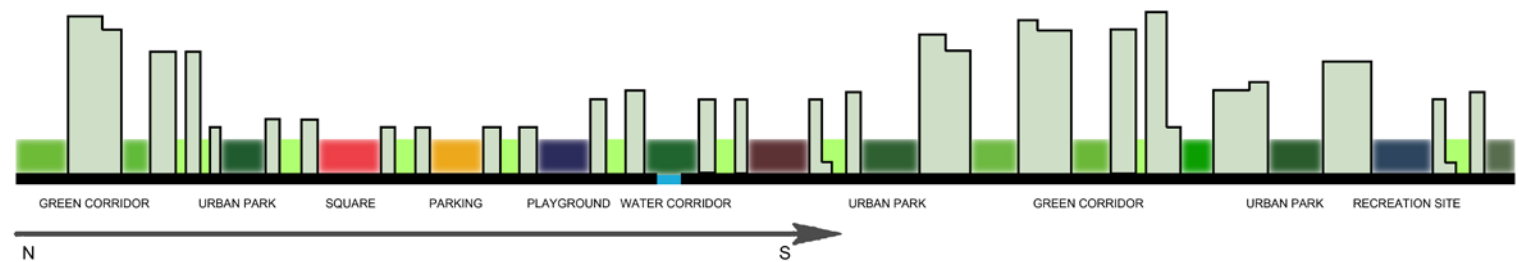
*Land-use plan
Housing density & location plan according to the nature infrastructure.*



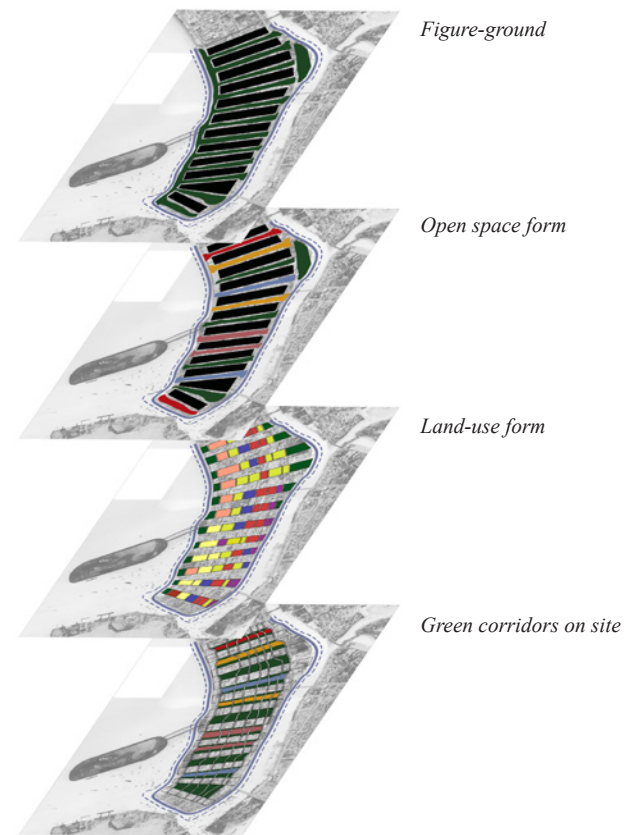
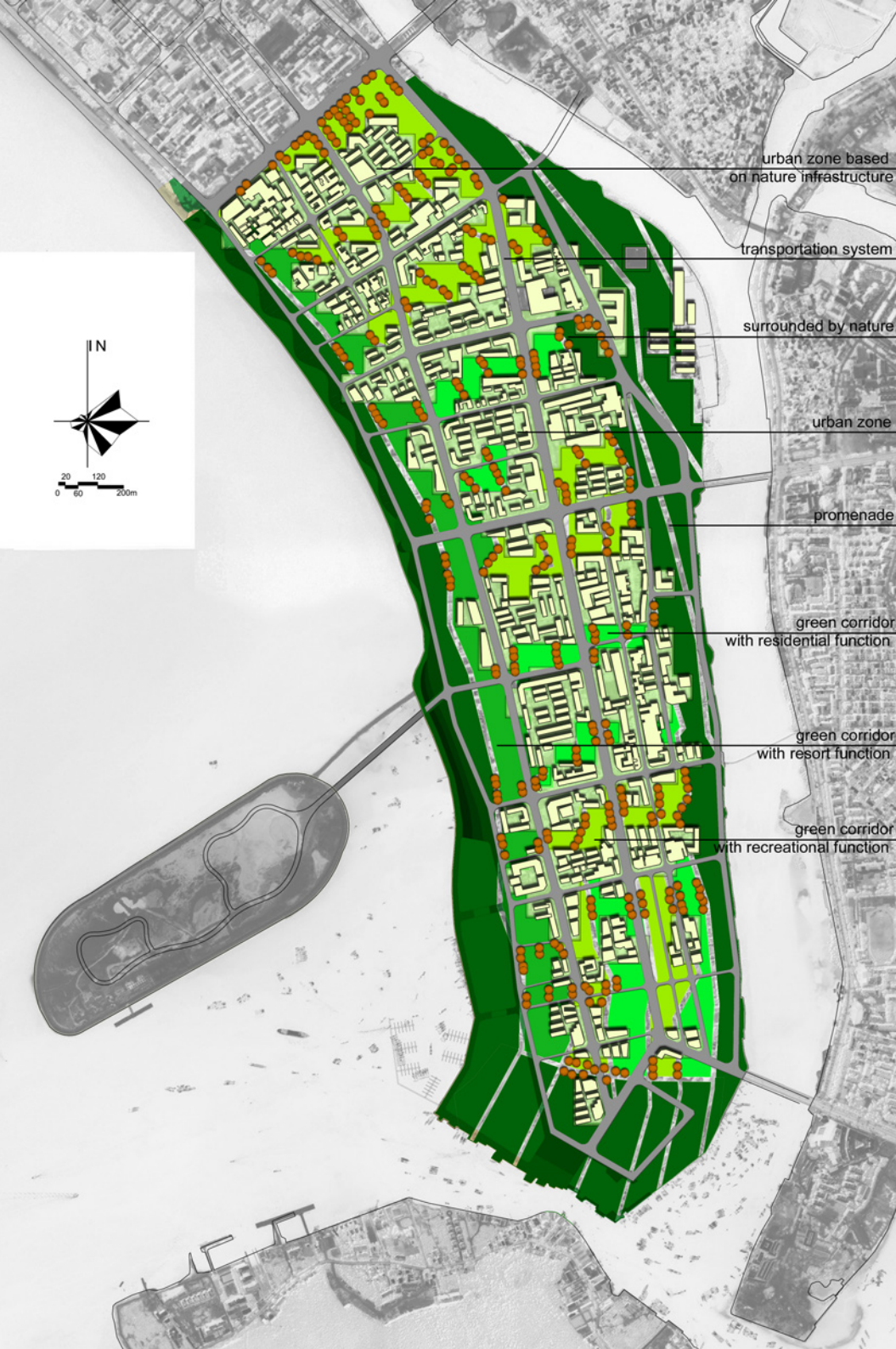
*Open-space system plan
Green corridors penetrate into urban fabric which connecting the seafront with urban context.*



*Green corridors as urbanization site
By addressing functions in the green corridors, the green corridors act as housing site as well as open space with the ecological and recreational function.*



Section from north to south of the central waterfront showing the development model under the nature infrastructure.



By absorbing the ecological influence into the urban context the regional Sanya can be understood as a living system, and the 'natural infrastructure' is developed to guide and frame the urban development. The natural infrastructure has translated the natural influence into urban structure in terms of location and density of development as well as the open space system.

At the medium scale, the regional 'natural structure' is interpreted as the urban structure to guide the urban development. The central waterfront is mainly in the category of the last two levels of medium and high ecologically vulnerable areas. From this binary of the two levels, a figure-ground structure is formed for the site from the natural infrastructure, and this figure-ground is translated to a land-use plan and an open space system. Urban function is allocated in the figure-zones from the middle to the edge in terms of land-use type and density. Open space is located along the coast and riverside area and connected by green corridors.

The urban zones are surrounded by green space and connected with promenades, and the green corridors penetrate the urban zones from the old residential area, the resort area and the seafront open space. Together with the existing conditions from resorts and residential areas, the green corridors can deliver different functions and experiences.

Central waterfront landscape plan

In terms of how to assimilate the green corridors into the existing conditions of the site, guidelines are created to deliver different types of connections in the residential areas, resort zones and seafront open spaces. Layering, zoning and thickening concepts are tested to practice the guidelines in the next three scenarios.

In the zoning scenario, Mcharg's 'natural value' concept was experimented with and expanded into the design of urban form and the urban open space system. However, Mcharg's suggestion in 'design with nature' is more like an accumulation of comprehensive natural data; the lack of reflection on the urban context made it separate the ideal natural model from human activities.

In this scenario, through the practice of zoning concept, the ecological, topographical and social conditions from macro scales were absorbed into one system. As an outcome of the zoning scenario, the natural infrastructure acted as the structural landscape network guiding the integrity and identity of the urban form. Moreover, by transforming the natural infrastructure into a 'figure-ground' condition of the city, the natural structure was connected to the urbanization to offer a sustainable ecosystem, frame urban development and provide recreational experience.

The limitation of this scenario is that, in the proposed landscape plan, I have juxtaposed the binary – figure and ground – through the natural infrastructure on the central waterfront, focusing on how to embody the landscape structure into the existing context but neglecting the connection between the binary. How to integrate the figure and ground, housing and open space would be the next stage of my research.

However, in the zoning scenario, I have effectively engaged the landscape structure into the urban context at the urban scale to guide the urban development. Through utilizing the ecological and landscape factors to intervene in the urban form, I began to realize that, compared to unstable factors such as land prices or political borders, landscape and ecological factors are more stable and durable to guide the form of urbanization.

*Green corridor
in existing green land*



*Green corridor
in old residential area*



*Green corridor
in developing resort area*



*Green corridor
in seafront open space*



Guidelines for green corridors on existing sites



Location of selected site



Existing site condition



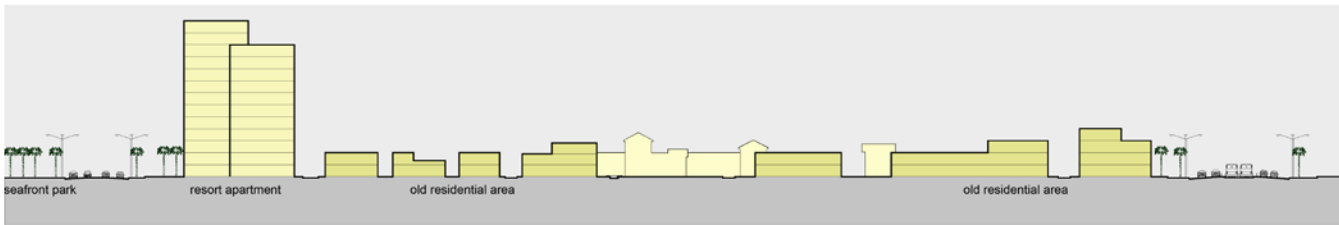
Abandoned transportation site



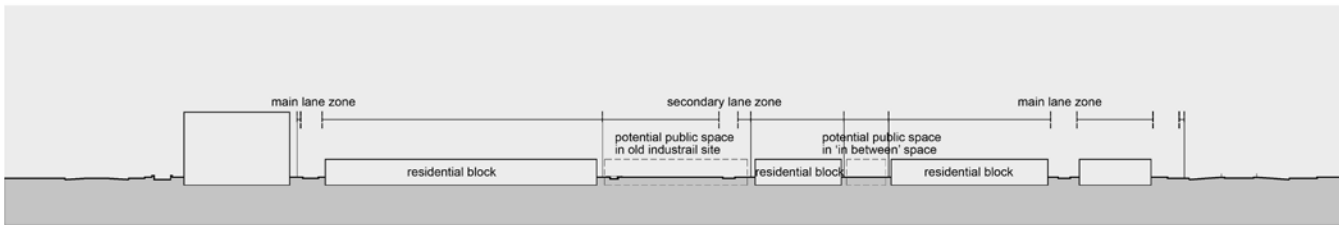
Fragmented space



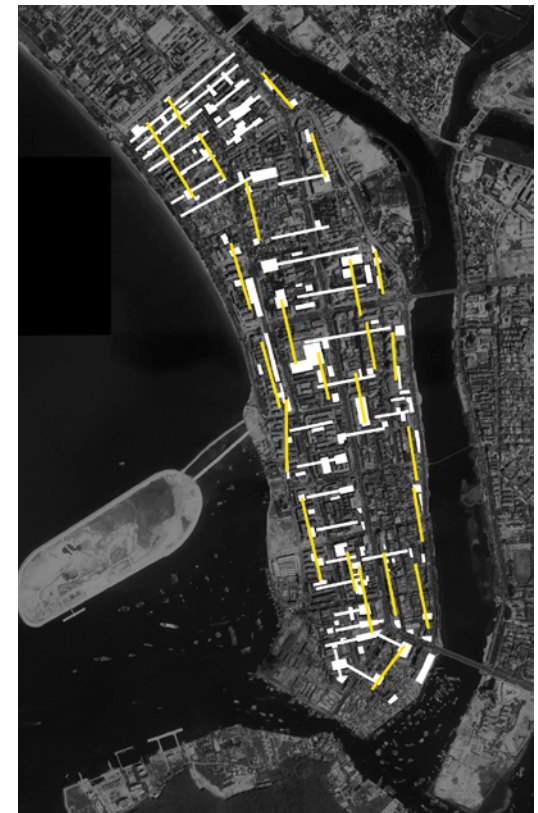
Existing Open-space structure at urban scale



Existing section A-A



Analysis of the existing conditions of the site and the potential open space



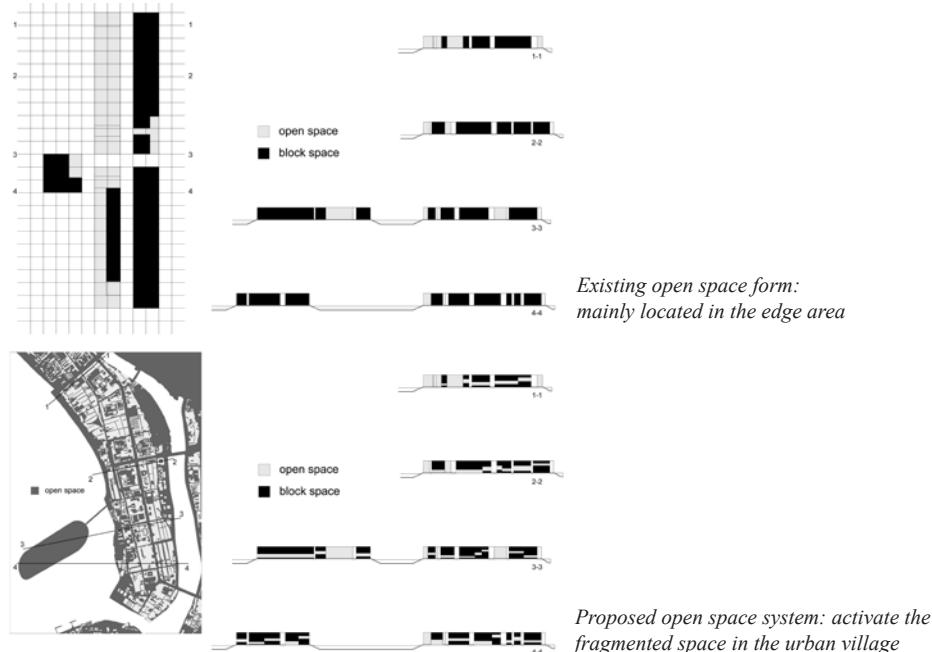
Potential network of open space including the old residential area

Layering: old residential area re-development

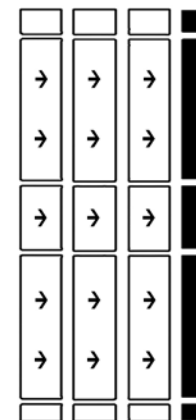
The layering concept was tested in the re-development of the old residential area. The selected site included two major parts: the old tenements and unused transportation sites (abandoned railway and station space), with narrow laneways connecting the site to the outside context. The fragments of unused industrial sites and unused space inside the sites have wasted a lot of open space and broken the continuity of the open space system.

At the urban scale, the existing green system in the central waterfront is concentrated along the margins and the middle part where this site is located has a lack of open space to address recreational and ecological functions. By identifying the potential open space and use of a landscape layer to create connections, the wasted space can be renovated as part of the open space system. In the proposed open space network in the old residential area, the regenerated space will integrate with the old residential area into the urban open space system.

At the site scale, an analysis of the existing conditions of the site, including the existing open space usage pattern and the circulation system, revealed that the urban pedestrian flow over the site is forced to the outside of the site; the potential volume of the open space inside the site was not utilized in terms of poor identity and accessibility. By creating identical entries, continuous paths and nodes, the abandoned space within the residential area has the potential to be regenerated as a big part of the urban open space.



As a result of the study on the housing and existing open space layout of the site, the once wasted spaces can be utilized as open space and has been identified including the old transportation site, railway space, gaps between houses and an unused pathway. These abandoned spaces, together with the existing open space, have made up a potential open space network on the site.



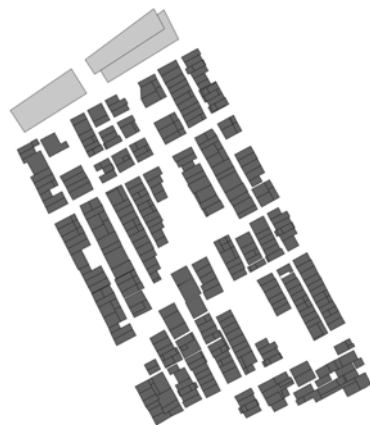
Landscape layer on existing conditions to connect fragmented space and form new open space system



Plan at urban scale showing the integration of the 'urban village' to urban open space system



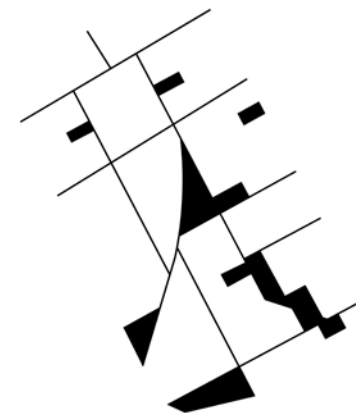
Circulation study: existing condition



Existing condition: housing layout



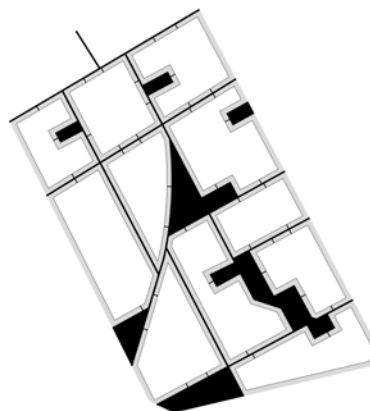
Potential public open space



Network of path and open space



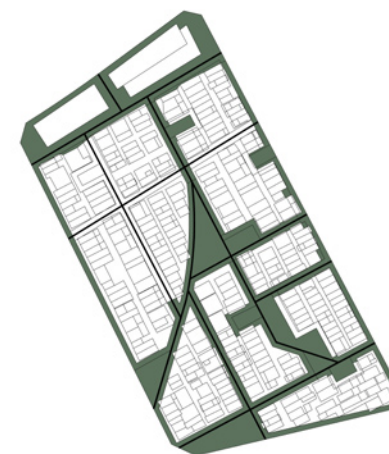
Circulation study: proposed system
 1.pedestrian flow 2.forced flow 4.existing node
 5.proposed node 6.proposed path 7. conducted flow



Enlarged gateway system for local residents



Open space system for interior



Open space system for exterior

To maximize the use of the site for a larger urban area, the design had to address the missing link of inventing a continuous landscape layer. If landscape elements – vegetation, pavements, seating and water features – can be used to rearrange this potential open space network, then the generated open space can provide a 'relational layer' to connect the fragmented space in the urban open space system.

A study of space usage by the local residents in the site has revealed that the open space that was frequently used by the residents was limited in its pathway space adjacent to or within close proximity to their homes. By integrating the pathway space into the proposed open space, an enlarged open space system is created for the local residents that can provide more convenient circulation and recreational function. At the same time, by identical entrances and continuous open space formed by the landscape layer, people from outside, including dwellers and tourists, can be led into the site and thus the open space in the site with higher volume is shared over a larger area.

From the proposed plan of the site, the abandoned transportation site is generated as an industrial park with identical entrances and a continuous path system created by a pavement and furniture; recreational facilities can be addressed in the created space such as playgrounds and small parks. Through layering, the landscape layer overlapped on the site has activated the enclosed area.

In this scenario, Forman's ecological continuity idea was expanded through the layering concept. The advantage of this scenario is that the continuous flow of natural elements from 'land mosaics' was regarded as a continuous landscape layer where the fragmented space can be addressed to create a continuous field that is then conceived with new landscape elements and functions. This landscape layer acts as a relational structure that links what was once abandoned space to the open space system.

As Stan Allen stated for infrastructure, 'it works not so much to propose specific buildings on given sites, but to construct the site itself.' In the same way, as I have learned from this scenario, landscape may not only address function into it, it can also organize and manage the urban space and complex system of movement.

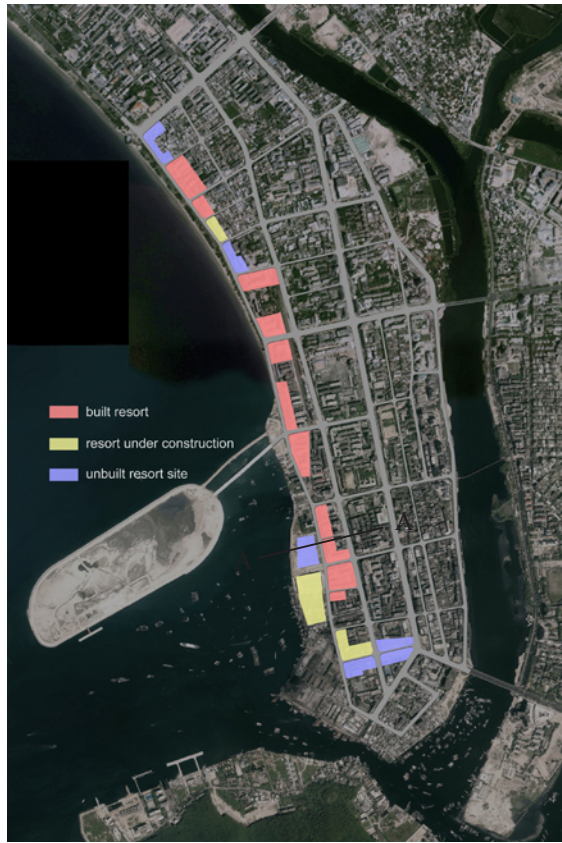
The weaknesses of the layering scenario lie in that firstly, I have proposed a spatial solution to activate the fragmented spaces in the old residential area, but I didn't consider the cultural influence from this imposed landscape layer on the lifestyle of the local residents and the relationship in the neighborhood. Secondly, how to continue to improve the traditional spatial and landscape type in the proposed enlarged open space is another question to extend this scenario further.



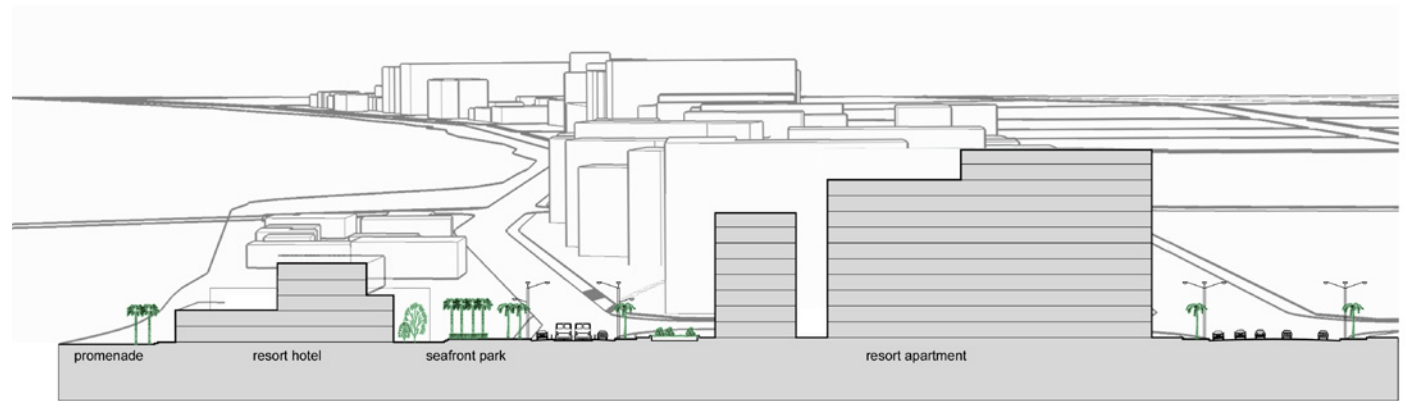
Proposed landscape plan for the old residential area re-development



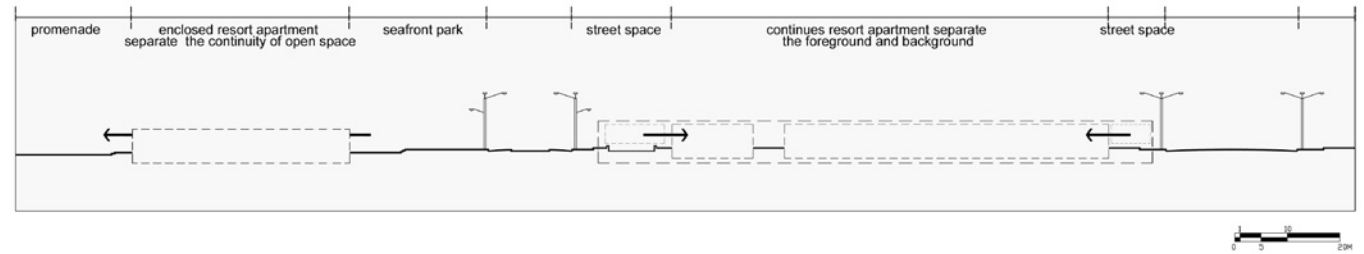
Proposed section A-A



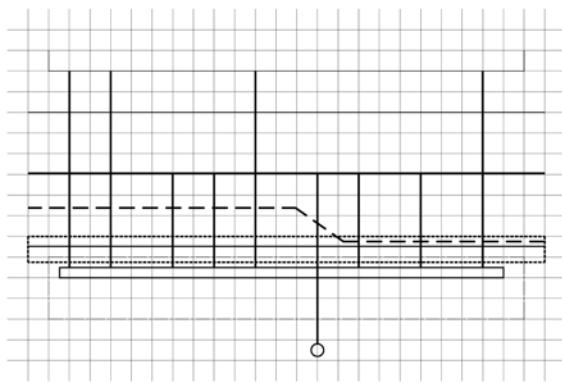
Existing resort sites allocation



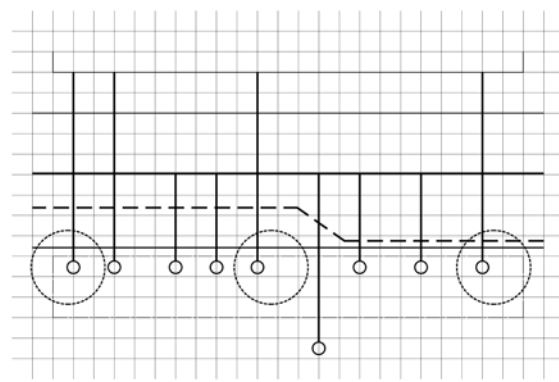
Section A-A



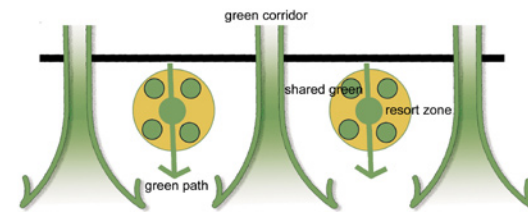
The continuous resort units spatially and visually separated the seafront open space from the background and broke the continuity of urban public open space system.



Existing separation of urban continuity

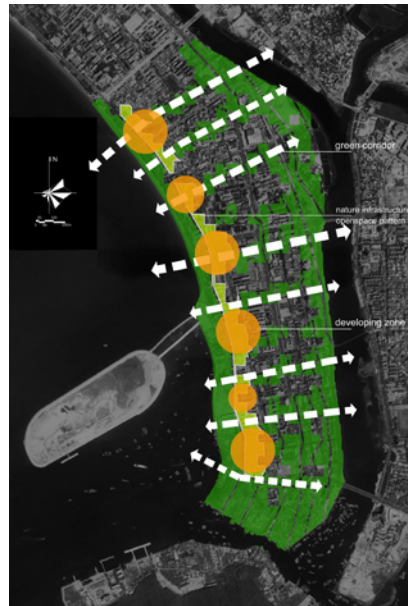


Proposed linkage to urban fabric



Proposed open space structure for resort zone

Merging: foreshore resort area development



Nature infrastructure set up the overall form for the resort zones



Proposed land-use plan in the resort zones



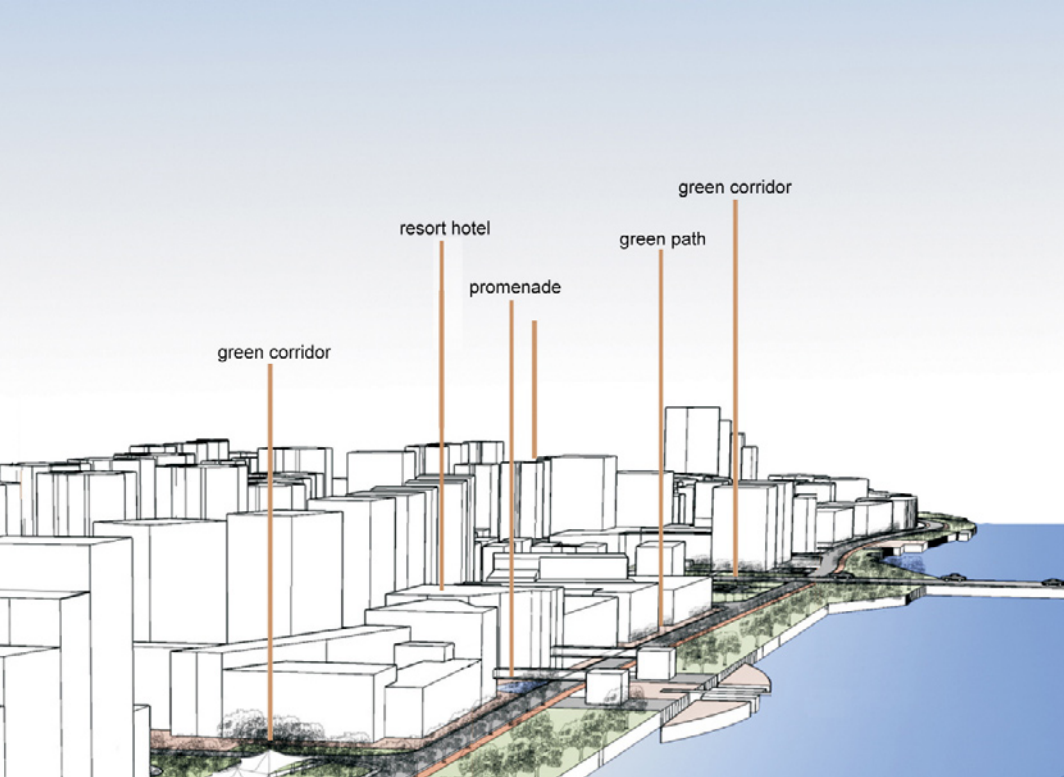
Proposed open space system



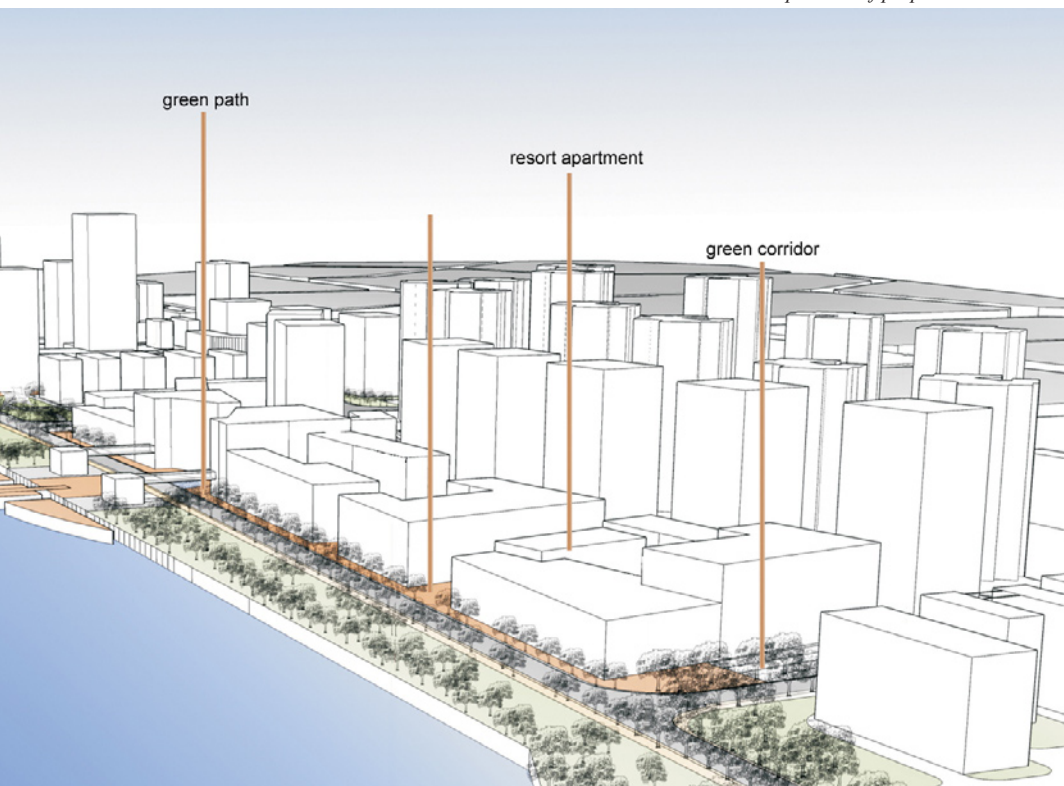
Proposed pedestrian circulation system



Proposed master plan for resort development



Perspectives of proposed resort zones



The 'merging' concept was tested for the foreshore resort development in this scenario.

The built resorts, the planned resorts and those under construction have almost taken up the whole foreshore area of the central city. The successive buildings have spatially and visually separated the seafront open space from the background. Moreover, by taking the adjacent open space for their own use in terms of insufficient parking and frequent social activity²⁴, these private units have broke the continuity of the public open space system.

In this scenario the green corridors, which were introduced in the zoning scenario, are embodied in the layout of the foreshore resort development. With the continuous green space penetrating the resort area, the private open space within this area, including open space inside and between the resort units, needs to be utilized to overcome the separation.

At the urban scale, the master plan of the resort area that translated from the natural infrastructure in the zoning scenario was to activate private open space into part of the green corridors. These corridors can be understood in three sectors: the roadside green space between blocks, the pathway between two adjacent units and the open space inside the resort. The functional layout of the foreshore area was organized by the proposed continuous green framework where the private open spaces are absorbed into the public system. A continuous pedestrian system in the resort zone has connected the seafront open space to the urban background.

The 'merging' concept enables the landscape to maximize the usage of the in-between roadside open space while utilizing the open space inside the resort and connecting it to the continuous urban public space system. In this way, the seafront was connected to a wider urban context from the green corridors between the resort units and the shared promenade across the resort units.

At the site scale, through organizing landscape elements as plantings and furnishings into the proposed shared private open space, the integrity and continuity of these elements in the merging field produced not only a sense of public space, but also environmental conditions to support public activities.

With the proposed merging landscape in the resort area, the recreational and ecological functions were addressed in the in-between corridors; the promenade inside the resort can provide an opportunity for pedestrians to approach the seafront; and the continuous open space across from the resort buildings has visually connected the seafront and the background.

In the merging scenario, Allen's connective infrastructure thinking which, from the user's manual developed by Stan Allen to describe the infrastructural approach to the design for the Logistical Activities Zone competition, was practiced through the merging concept. In the same way as infrastructure functions, the merging landscapes in this scenario are considered as connectivity that provides a coherent system among the once-isolated private sectors and links them into the urban public space.

From the merging scenario, I have understood the role of landscape as a linkage to mediate the differences between inside and outside, public and private. Rather than an isolated resort building with its enclosure and limits, the landscape has transformed it into a field that allows for alternate uses and needs.

The negative aspect of this scenario lies in that I have focused on the spatial linkages but neglected the social linkage. The enclosed and private space was generated as an open and public space, but the conflict between people living inside and people from outside – tourists and city dwellers – was not considered. How to mediate the shared space into a flexible and compatible field, where the two groups of people can both truly and harmoniously engage in would be the next question for this scenario.

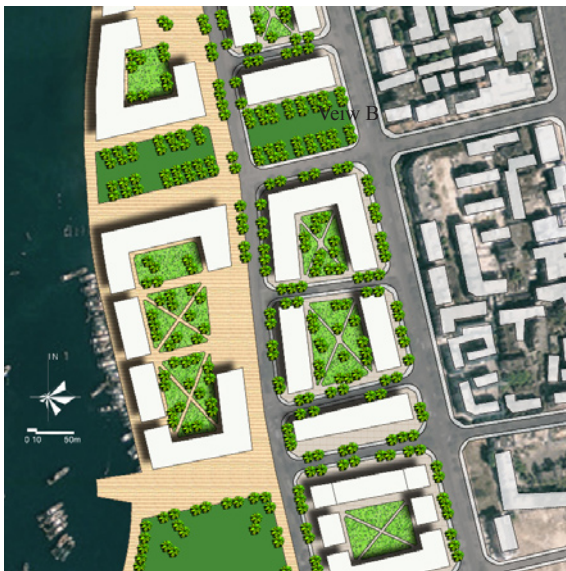
*View A:
green path inside resort
links pedestrian system
to seafront*



*View B:
open space between
resorts link green corridor
to seafront*



*View C:
visual lineage - seaview
through resort*



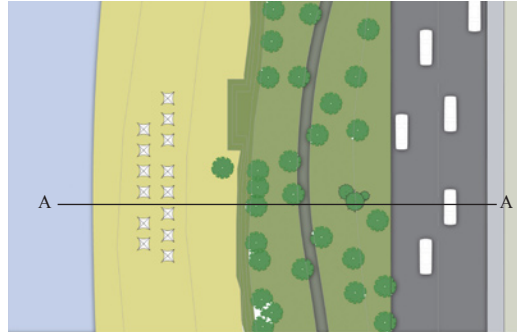
Green corridor between resorts



Shared open space inside resort



Location of selected site



Beach steep promenade road
Existing plan



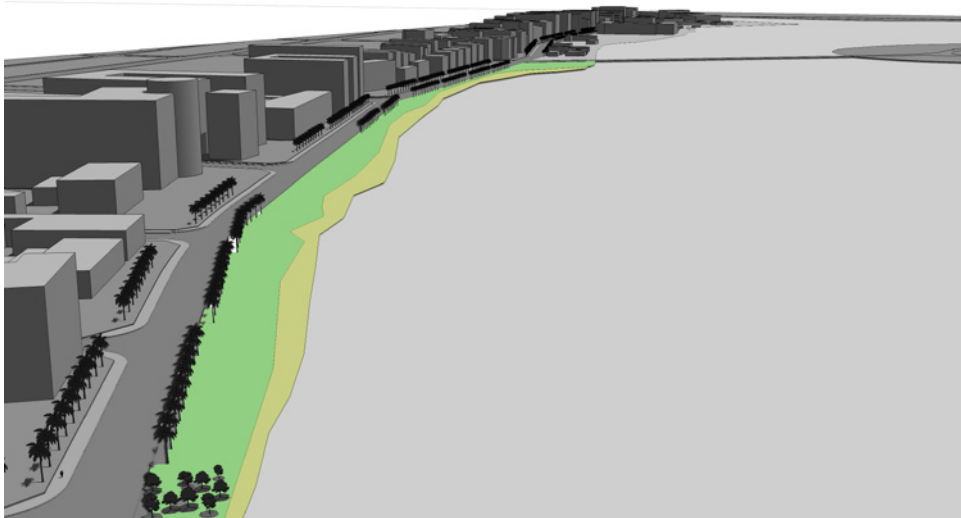
A - A section



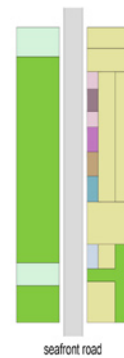
Before: Public service in the residential area along seafront



Before: old market in seafront open space



Existing seafront form for resort purpose



Public service used to be in residential area along seafront



Residential and service replaced by private resort units



Lack of public service in the seafront

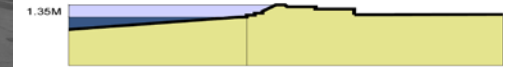
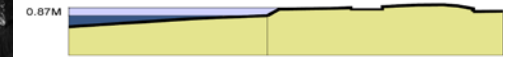
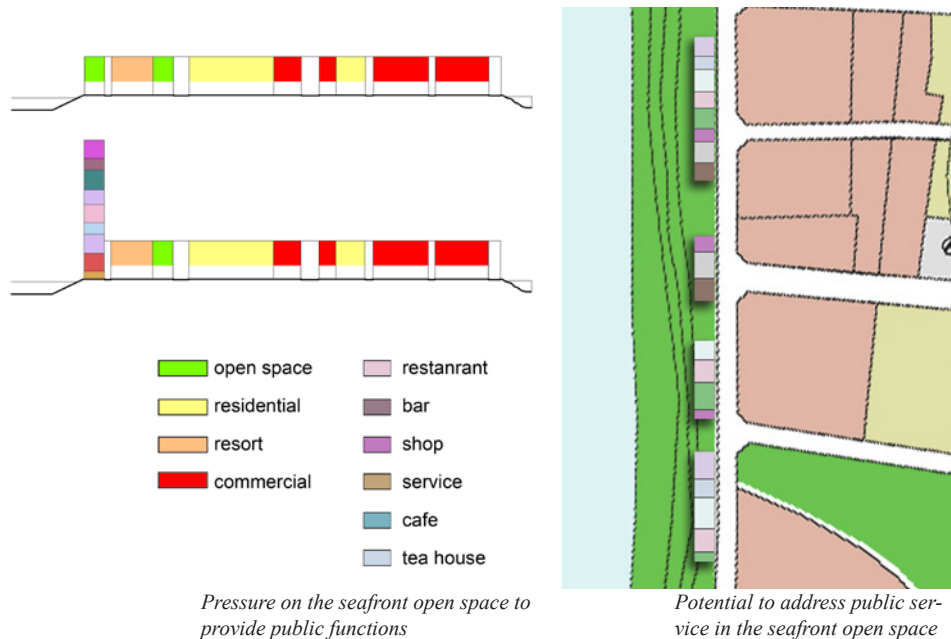


Thickening: seafront landscape design

The existing resort form of the seafront landscape is simply to make paths to the beach. This form cannot address enough functions for the urban transformation in terms of lack of public service and ecological utility.

Firstly, public services such as restaurants, bars and shops were once located along the seafront in front of the residential area, but these functions are gradually being replaced by resort hotels and resort apartments. The lack of public facilities has put pressure on the seafront open space to provide these public functions. Secondly, the seafront has ecological functions such as preventing sand, tide and wind. The existing solution is to use woods and different levels of steep banks on the waterfront, which has taken a big part of the open space. Thirdly, the lack of green space in the city area has applied big pressure on the seafront – the seafront open space needs to offer public space to provide recreational space for the city. Currently, these multiple functions are not served by the limited space on the seafront.

In order to enlarge the volume of the seafront space to address ecological, functional and recreational needs, the thickening concept was utilized to increase the capacity of the seafront open space.

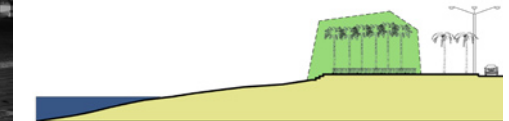


*Ecological function of seafront:
tide preventing*

*Different levels of 'bank' in the
existing seafront*



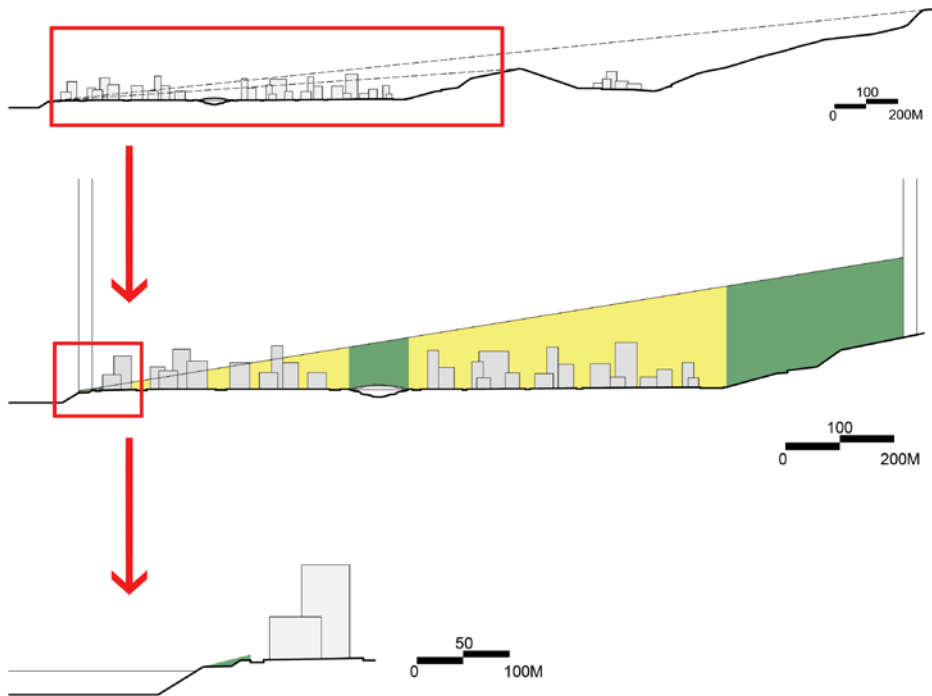
*Ecological function of seafront:
sand and wind preventing*



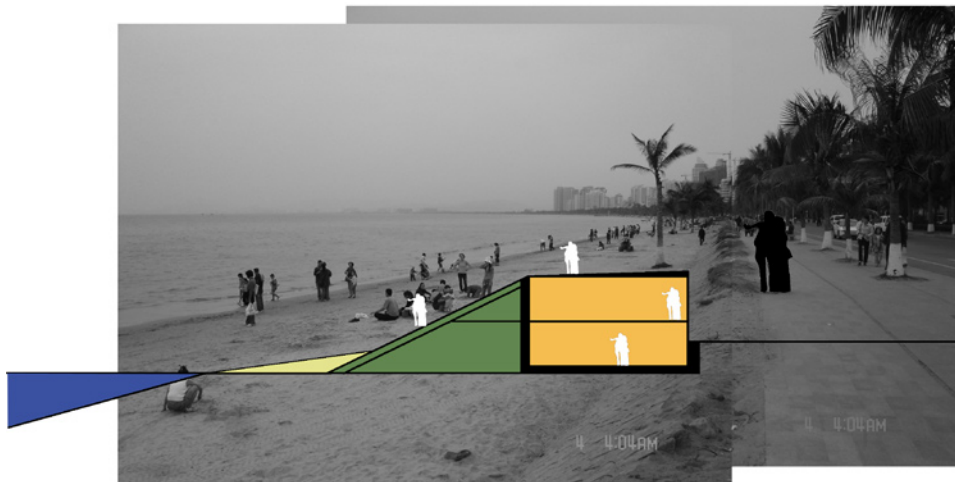
*Using woods to prevent sand and
wind in the existing seafront*



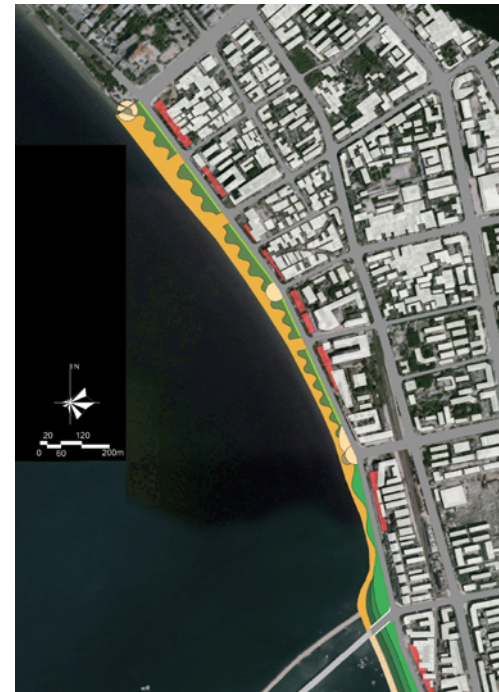
Need for recreational function



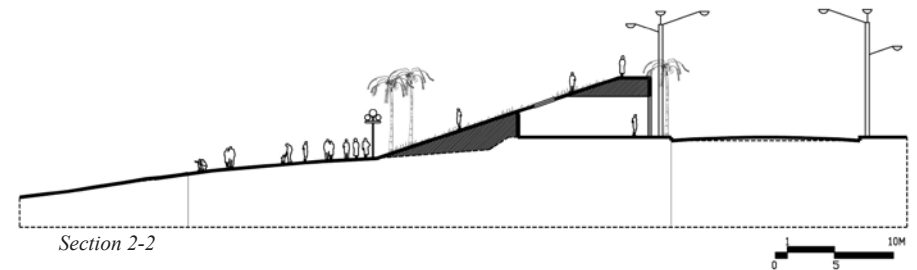
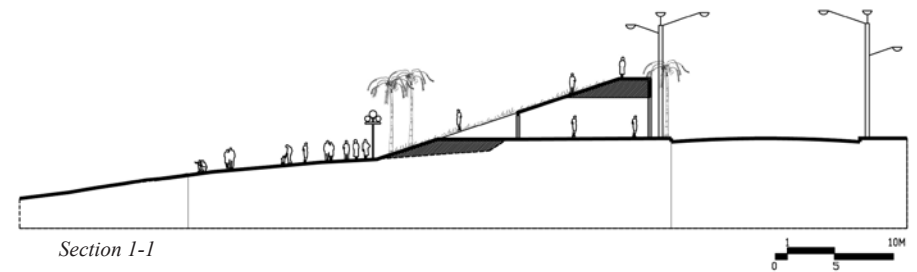
Translate the urban topography form into the form of seafront to emphasize the continuity



Thickening ground to address multiple function



Seafront layout at urban scale



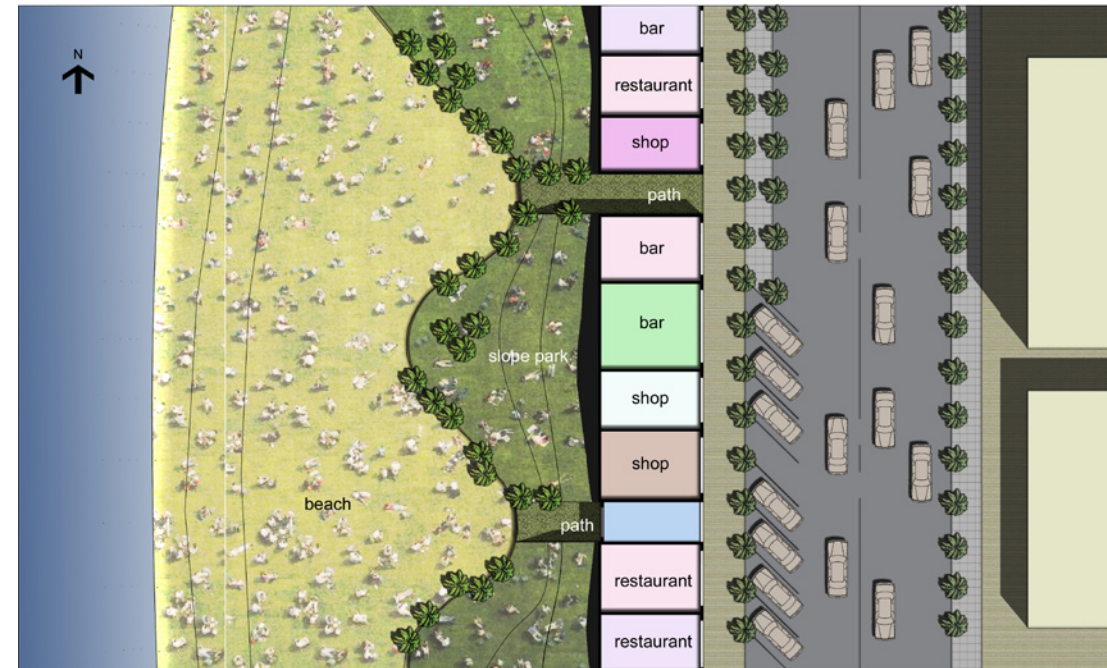
Propose seafront section

At the urban scale, Sanya city is a city sloping from the mountains to the seafront. By thickening, the slopes form was translated into a thickened seafront area to emphasize the topographic continuity while addressing its functions. The seafront space is thickened in selected sectors with a multi-level ground and a continuous surface. At the same time, essential entrances are preserved in the urban circulation nodes to connect the continuity of open space and to provide enough sea view.

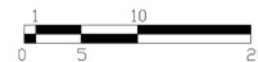
At the site scale, the thickened seafront can provide an ecological function, public service and more open space. Firstly, a series of public facilities can be designed into the multi-level site such as shops, a service center and restaurants. The thickened surface can also offer shield access to the beach area. By blurring the boundary between the forecourt area of the service facilities and the seafront road, parking and a recreational area can be generated along the edge area. Secondly, instead of the multi-level steep form in the existing site, the continuous surface of the seafront can save a lot of space to provide recreational and resort activities. By curving the margin between the beach and the area of the seafront open space, some areas can be created to form spaces such as small squares that can offer long-term residency on the seafront without being interrupted by the movement of people. Thirdly, instead of woods and banks, the thickened section of the waterfront can prevent tide and sand movement due to its increased gradient.



Proposed plan - top level

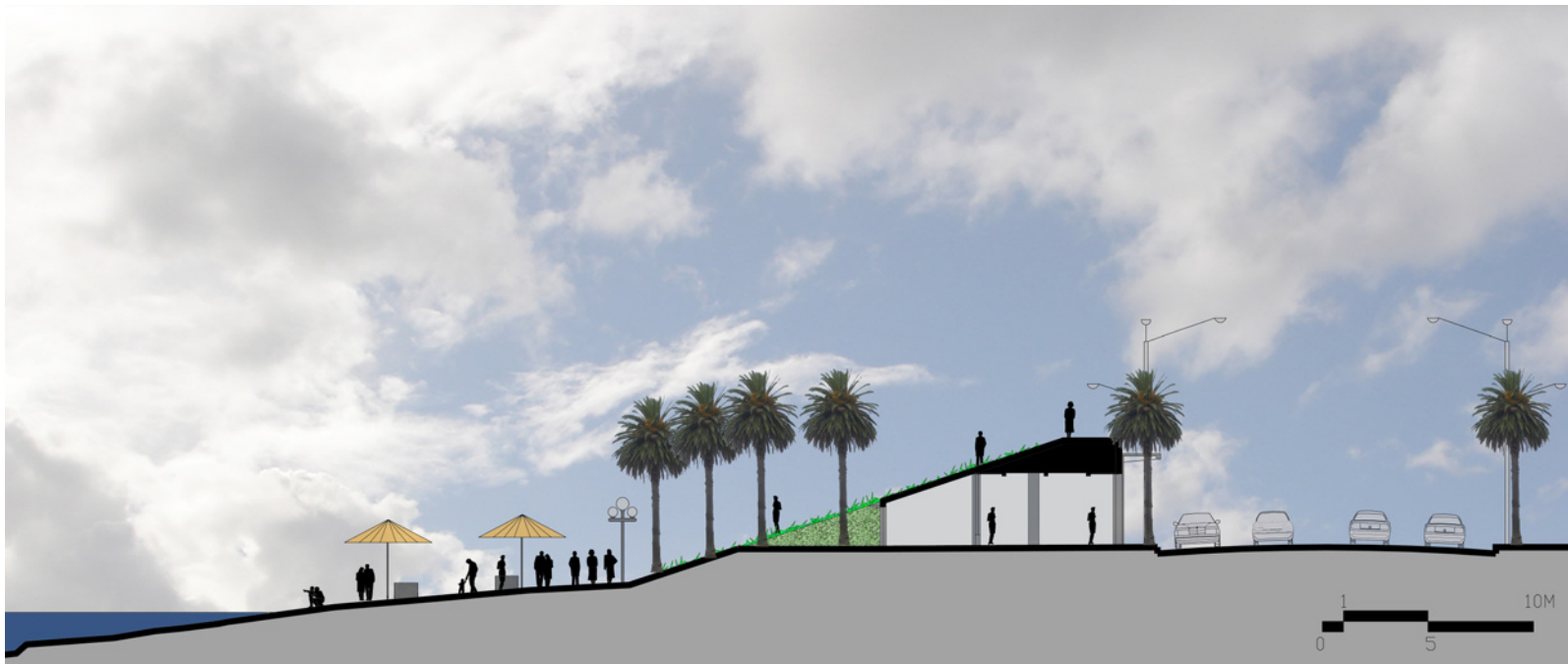


Proposed plan - bottom level





Proposed seafront open space - elevation



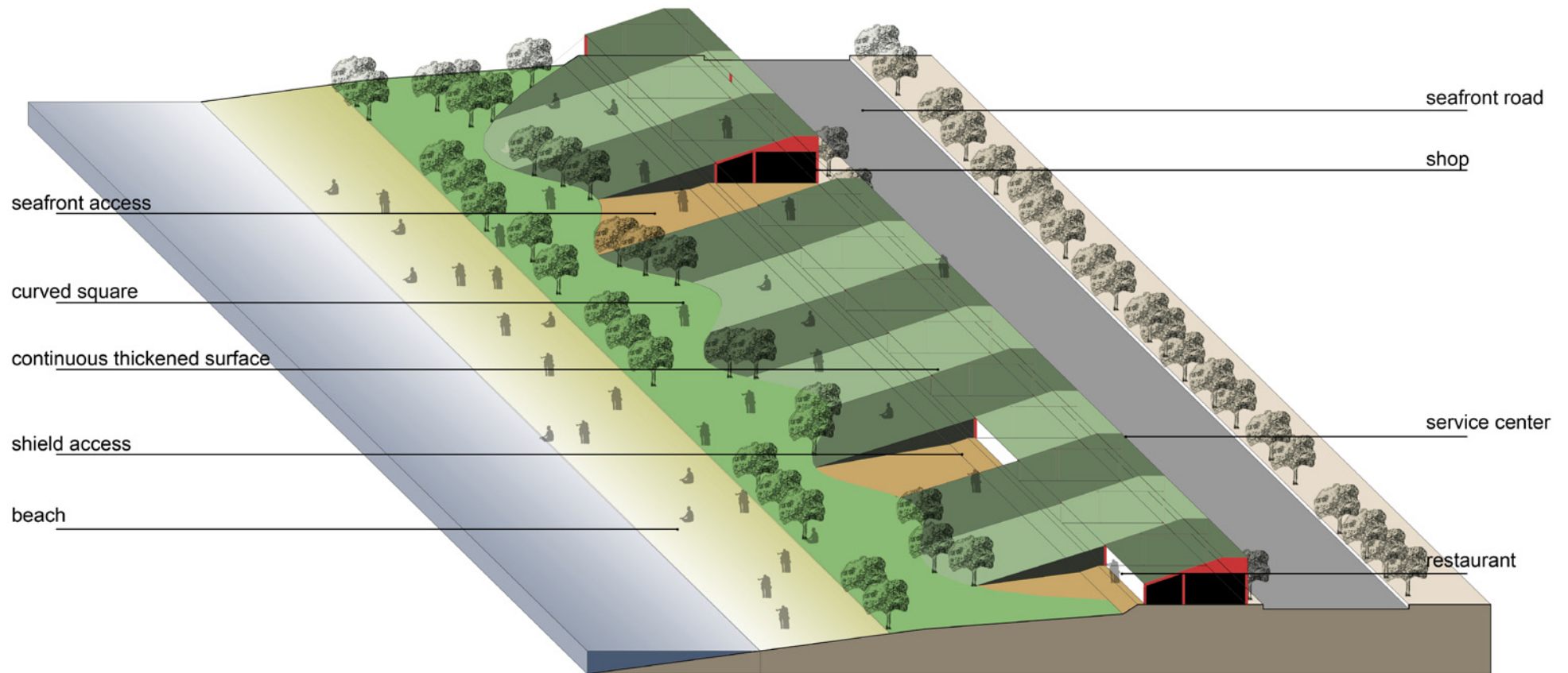
Proposed seafront open space - section

Alex Wall suggested 'the goal of designing the urban surface is to increase its capacity to support and diversify activities'.²⁵ In this scenario, the goal was realized by the thickening concept. The proposed coherent and multi-layered landscape has extended the continuity of urban open space while providing an increased volume to address a range of public activities and services. At the same time, other systems including ecological and cultural systems were also integrated into this thickened landscape.

From the thickening scenario I have understood that landscape is an immense system to address the complexity

and density from an urban context; it is also an operational structure that can organize this complexity and density into one intensive landscape in an efficient order.

The limitation in this scenario is that the literally thickened seafront form has sacrificed a lot of sea view and also caused ecological problems including the difficulty of arranging plantings on the thickened surface. How to increase the capacity of the urban surface, not by changing its spatial form, but by other methods such as re-arranging 'time and events' to re-structure the space form, this will be a question for my future research.

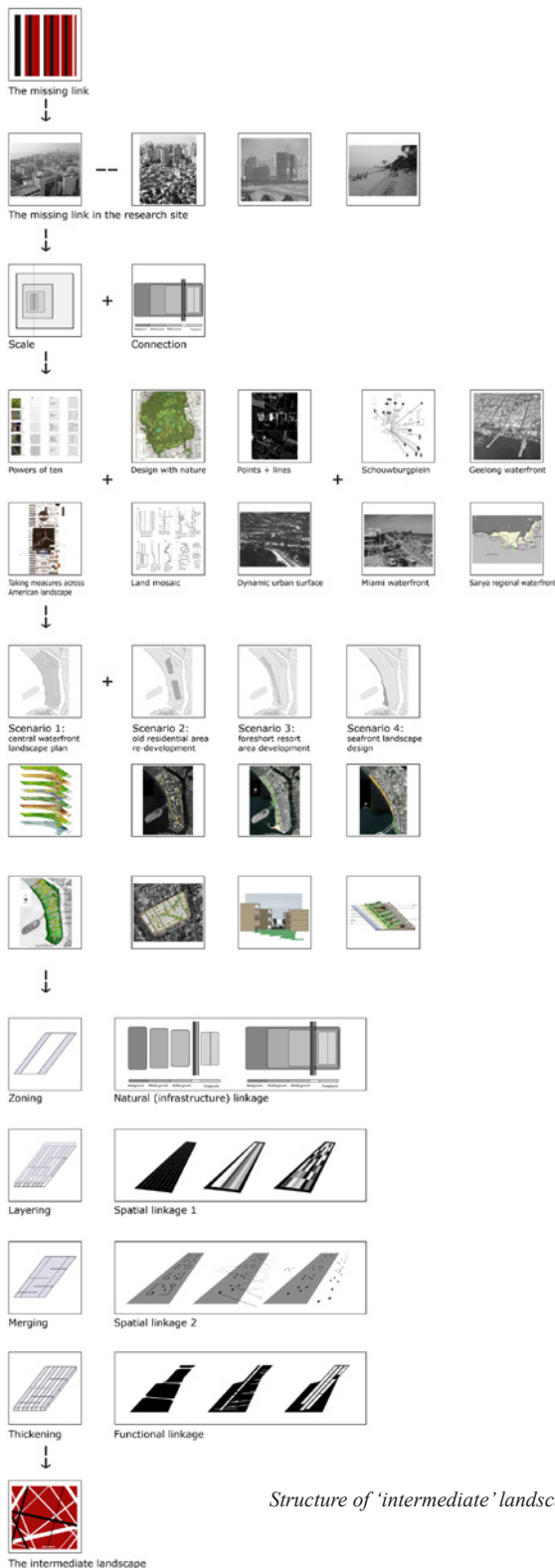


Thickened seafront model





Proposed section showing the 'intermediate' landscape as the linkage to connect nature and urban, public and private, fragment and overall.



Reflections on the research question

The master's research is an investigation of 'intermediate landscape' as a solution to the 'missing link' in the process of the urban development of Sanya city.

The research started with trying to define the term 'missing link' in the Sanya central waterfront development in terms of the relationship between urbanization and nature. After a study of the site and the urban context, the missing link was identified within the disconnection of fragmental space from the urban system, the disconnection of enclosed space from the urban fabric, and the disconnection of the seafont landscape type from urban transformation.

I have investigated a selection of precedents in terms of 'scale' and 'connection' that was the vehicle to understanding how the principles could be applied in the design of landscape and to form the concept of the intermediate landscape. After the theory and case study, the model of 'intermediate landscape' was established as zoning, layering, merging and thickening. Through four projects I have understood how landscape engages the layout of urban development and how landscape acts as a linkage to drive the design of urban open space and create an integrated system.

My research started with the idea that landscape is an operational tool that can detail the planning principles in the urban renovation. However, through an investigation of the site and the planning theme, the economic- and aesthetic-based urban plan was proven to be impotent in the set up of a structure for urban development in terms of the ecology, topography and landscape conditions from the natural form that were neglected in the planning theme.

Consequently, the missing link between the natural form and urbanization became the research problem, and the research question emerged as to how landscape can set a structure for the waterfront re-development and provide a durable urban environment. This was accompanied by two sub-questions: how to work across a range of scales simultaneously, and how landscape can act as a connection within the urban context and systems.

Through this exploration of 'intermediate landscape' I began to realize my understanding of the position of landscape had shifted from after the development as decoration to precede the development as direction; and the role of landscape had shifted from a certain object or a single system to the linkage between systems across scales.

Through the research process of questioning, forming and testing the concept of 'intermediate landscape', the research question was answered by the intermediate landscape. Firstly, landscape acts as a linkage that connects the natural form with the structure of urban development in terms of directing the location and density of development as well as the open space system. Secondly, landscape embodied the developing structure at urban scale into the integrated form of urban open space at site scale. Finally, the landscape has set up the framework for the waterfront development and provided an adaptable urban environment.

Both of the sub-questions about 'scale' and 'connection' were answered during the process of the research through a series of investigations and design exercises. The two questions were not investigated directly; instead, the concepts of 'scale' and 'connection' were abstracted from precedent studies as the two key factors to form the notion of 'intermediate landscape', and then drove the design process to develop solutions. In this research,

Conclusion

'scales' is the way to understand the missing link in an urban context and structure the research of the intermediate landscape; 'connection' is the method of solving the missing link and practice the intermediate landscape.

Intermediate landscape

Understanding how landscape can act as an agent is to understand its connective and operational character. It does not focus on a certain urban area at a certain scale, but as an interconnecting and structural system that works in the process of urban transformation. In this research, what I learned and understood about the term 'intermediate' is that landscape as the linkage to connect nature and the city, public and private, fragment and overall. Through this master's research, there are three key outcomes from the 'intermediate' landscape:

Landscape in this research is a natural linkage coordinating urbanization with nature as a 'natural infrastructure'. In zoning scenario, the natural forms of Sanya city such as the ecological and topographic conditions were translated into the urban structure by landscape. This structural landscape worked as a natural infrastructure, which precedes the planning theme to guide urban development. The natural infrastructure formed by the landscape has framed the urban land-use form, addressed different levels of density, and offered the structure of an urban open space system.

Landscape in my research is a spatial linkage connecting potential fragmented public space to the urban open space system as a 'relational structure'. In layering scenario, a landscape layer was conceived by integrating the fragmented space to create a continuous field, which has an increased capacity to address new elements and support activities. In merging scenario, the landscape has

merged the private open space into the public to provide an unbounded field, which enlarges the limits of private space and makes it suitable for different uses and needs.

Landscape in my research became an operational linkage organizing functions and activities as an 'urban distributor'. In thickening scenario, the seafront open space is conceived as a thickened ground. The operational landscape has not only distributed different needs for the seafront into the multi-layer space, but also created a continuous surface to address increasing density.

Be 'intermediate'

To be 'intermediate' for me is to think beyond a certain scale and boundary and to consider how landscape can act between interconnected systems. The outcomes this research developed are to suggest landscape architects need to be 'intermediately' in the landscape design, which means one should think comprehensively, relationally, and systematically.

Through the investigation of intermediate landscape I have understood the complexity of the urban landscape in terms of how it functions and how it intervenes with urbanization. Through the practice of intermediate landscape I was able to create a relational and dynamic urban landscape and understand the way landscape operates.

Limitations and emerging questions

This research has enabled me to develop a wider understanding of landscape and it has also led me to a wider field where I see the limitations of the research and have encountered more questions than I have answered.

The missing link in my research focused on the discon-

nection between natural conditions and urban development; to consider the missing link in a wider field would be to understand and look at more conditions – economic, political, social, and so on. How can landscape address and link these impacts into urbanization?

The relational landscape conceived in the layering and merging scenarios is a temporal spatial linkage under certain conditions, which is more adaptable but less durable. The question is how to make this relational landscape capable of absorbing future demands and allowing future modifications.

The proposed seafront open space (thickening scenario) is a literal thickened space arising from the special topographic conditions. For a single-layered open space, the question is how to increase capacity by landscape programming to support a diversity of uses.

Afterword

Reflecting on the research of intermediate landscape, the inspiration of the master's research was to form a new understanding of the urban landscape and explore the potential of landscape under modern urban circumstances and transformations.

Intermediate landscape is the landscape across scales and boundaries as part of the interconnected urban system; it is also the landscape to address functions and offer re-organization for the urban environment. The connective intermediate landscape is far more relational and functional than the decorative landscape. As Alex Wall argued, 'it is not only to make cities attractive but also to make them more adaptive, more fluid, more capable of accommodating changing demands and unforeseen circumstances'.²⁶

Endnotes

1. Girot, Christophe., "Vers une nouvelle nature," in Eidgenössische Technische Hochschule Zürich., *Landscape architecture in mutation: essays on urban landscapes*, Zürich: gta Verlag, 2005, p 30.
2. Sanya government., *Sanya Master Plan 2006–2020* (revised version), 2006, p 42.
3. Corner, James., "Terra fluxus," in Waldheim, Charles. (ed.), *The landscape urbanism reader*, New York: Princeton Architectural Press, 2006, p 28.
4. These resort apartments are owned by the people who only spend two or three months per year on vacation; these buildings are left vacant for most of the time.
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16. Wall, Alex., "Programming the Urban Surface", in Corner, James. (ed.), *Recovering Landscape: Essays in Contemporary Landscape Architecture*, New York: Princeton Architectural Press, 1999.
17. The indigenous seafront means the original fishing villages that are disappearing; the short-term resort area is planned for travelers for short-term vacations, and the main context is the resort hotels. The long-term resort area is built for the vacationers who buy a house or apartment here and spend two or three months per year for holidays; it is made up of resort apartments. The recreational seafront is designed for tourists and travelers to experience the marine activities.
18. AILA, "Waterfront Geelong" (online), available from: http://www.aila.org.au/awards/2002/geelong_foreshore/ (accessed: 17 Mar 2008).
19. AILA, "Waterfront Geelong" (online), available from: http://www.aila.org.au/awards/2002/geelong_foreshore/ (accessed: 17 Mar 2008).
20. Marot, Sebastien., "The Reclaiming of Sites", in Corner, James. (ed.), *Recovering Landscape: Essays in Contemporary Landscape Architecture*, New York: Princeton Architectural Press, 1999.
21. Wall, Alex., "Programming the Urban Surface", in Corner, James. (ed.), *Recovering Landscape: Essays in Contemporary Landscape Architecture*, New York: Princeton Architectural Press, 1999.
22. Girot, Christophe., "Four Trace Concepts in Landscape Architecture", in Corner, James. (ed.), *Recovering Landscape: Essays in Contemporary Landscape Architecture*, New York: Princeton Architectural Press, 1999.
23. Allen, Stan., *Points + lines: diagrams and projects for the city*, New York: Princeton Architectural Press, 1999.
24. Because there is no restriction on the use of public space in front of the resort units, it is prevalent for hotels to frequently occupy the forecourt space for private use (such as shows, advertising, etc.).
25. Wall, Alex., "Programming the Urban Surface", in Corner, James. (ed.), *Recovering Landscape: Essays in Contemporary Landscape Architecture*, New York: Princeton Architectural Press, 1999.
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